

AGRICULTURAL ADMINISTRATION IN INDIA

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N. SRINIVASAN

A handwritten signature in dark ink, appearing to read 'N. Srinivasan', written in a cursive style.



THE INDIAN INSTITUTE OF PUBLIC ADMINISTRATION
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PREFACE

This book is the outcome of a Seminar which the Institute was privileged to organise on behalf of the Ministry of Food, Agriculture, Community Development and Cooperation, Government of India for senior officials of the Ministry and State Departments of Agriculture early in 1966. The papers presented in this volume deal with the general aspects of agricultural administration in the country as well as with agricultural programmes and were specially prepared for the Seminar. Four of the papers in the first part were the working papers for discussion at the Seminar, the others constituting the documentation made available to the participants. Prof. N. Srinivasan, who was the Director of the Seminar, has contributed a number of papers besides undertaking the task of editing the other papers included in the volume.

The modernisation of Indian agriculture and its transformation from a way of life into an industry of high productivity and a profitable business are needed to enable the country to feed itself and to develop its nascent industries. In this context the highest priority has to be given to agricultural development in our plans. Programmes of development need to be formulated both realistically and imaginatively and executed with competence. It is the object of the studies included in this volume to assist both general and agricultural administrators in the understanding of the varied problems facing them and in the formulation and implementation of development plans in the field of agriculture. Students of public administration should also find abundant material for study and reflection in these papers.

The Institute is deeply grateful to Shri C. Subramaniam, then Union Minister of Food and Agriculture. Shri Asoka Mehta, Minister for Planning at the time and Shri B. Sivaraman, Secretary, Ministry of Food and Agriculture, whose encouragement made it possible for the Institute to organise the Seminar.

I would like to place on record the Institute's appreciation of the cooperation of the several contributors of this volume, who found time in the midst of their official duties to undertake these studies.

J. N. Khosla

Director

Indian Institute of Public
Administration

Dated the 1st October, 1968.

New Delhi.

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9-12, 1966 at the Indian Institute of Public Administration.*

Opinions expressed by different contributors are personal and do not, in any way, commit either the Government of India or any State Government or the Indian Institute of Public Administration.

INAUGURAL ADDRESS

C. SUBRAMANIAM

Friends: The current shortage of food makes it very appropriate that the Indian Institute of Public Administration should hold a seminar to focus attention on the problems of agricultural administration. At the very outset, I should say that this is a much discussed subject and various solutions to the problem have been put forward. If progress in the reorganisation of agricultural administration has been halting, it is not for want of an enquiry into or diagnosis of the causes of the present situation. However, it is useful to bring together the diverse opinions and points of view which have been expressed on the subject. This helps us to view them against the background of the present emergency and the new emphasis on and the need for science and technology in agriculture.

The ultimate focus of agricultural administration is the farmer of India. Our plans, our programmes are all motivated by the objective of reaching—in time—to the cultivator adequate quantities of inputs and incentives, in order to draw from him the response which would benefit him and the consumer. As a result of the rethinking that has arisen from the serious crisis that has overtaken us in the field of agriculture, certain clear lines of action have been laid down in the last year or so. While the top levels of the hierarchy, both in the Centre and the States have been reacting to this problem, I am rather seriously distressed at the fact that the administration at the lower levels has still not responded adequately to the challenge. This is not the fault of individuals, so much as it is a fault of the system.

Take the Village Level Worker who is the most crucial agency in the whole administration of extension. There is a confusion in our minds even now as to the role and functions

of the Village Level Worker. Should he discharge functions as varied as the gold-bond drive, land revenue collection or should he be the essential instrument to transmit new knowledge to—and take back the problems of—the cultivator? The first question which arises is whether even if the responsibilities are clearly defined, the Village Level Worker of today is competent to handle this responsibility of transmission of new knowledge and to act as a friend, philosopher and guide on occasions of difficulty. Often opinions have been expressed, that the Village Level Worker, with his knowledge, skill and experience is not fit to discharge these responsibilities. We have to get a more competent, better trained functionary in his place. For obvious reasons, we cannot immediately fill the post of every Village Level Worker in the country with an adequately trained and competent agricultural functionary. I would suggest, however, that we should make a beginning at least in the areas in which we are attempting the special intensive programmes with high yielding varieties of grains, oilseeds and fibres.

We should also experiment with some new approaches in the area of ensuring an effective link with the village. A suggestion has been made that the problem lies with Village Level Extension Worker who has no incentive in the spread of new technology. One way out may be to give a stake in this task to the progressive farmer of the village who has a reasonable and continuing experience of cultivation. He may be given a commission on the increased sale of fertilisers in the village or a bonus related to the increase in productivity. It is necessary that when the cultivator goes to his Village Level Worker for advice there should be no room for the lack of respect or confidence which arises because the Village Level Worker has neither the learning nor the practical experience which alone can equip him to be a proper adviser. It would, therefore, be desirable or even be necessary to involve in the village level extension work some of our more experienced progressive farmers. In the Meiji era in Japan, agricultural associations arranged for the better agriculturists to move from village to village for discussions and sharing their experiences with the others. A cultivator who has proven in his own field the advantages of new technology is a

far better advocate than a hundred Village Level Workers without the background of experience and successful operation in the field. We should take this fact into consideration. I would suggest that more use be made of those cultivators who have reaped the rewards of the new technology in their own fields. The various voluntary organisations of farmers like the Tonnage Club, are agencies which should be activated in this. We should also fully involve the instruments of mass communication like the Press, the Cinema and the Radio. I am particularly impressed in this regard by the weekly farm edition which is put out by one Telugu paper with the assistance of one of our scientists. There should be more such farm-numbers of our newspapers.

Talking of the problem of communication in a village, I am particularly distressed by the fact that the cooperative agency in the village functions in isolation from agricultural extension. A cooperative credit institution which functions purely as a bank lending to and recovering monies from the farmer has only an indirect interest in the spread of new techniques. If there is any place where agricultural technicians are needed, I would say they are needed most in the cooperatives in the villages. The new opportunities that arise from the spread of new seeds, new varieties of fertilisers, new pesticides, should be exploited by our cooperative movement. It must become a part of the cooperative management structure that there should be an infusion of agriculturally trained men at various levels of the cooperative hierarchy.

I am aware that a number of papers before this Seminar propose to discuss how to activate management of cooperatives in the cause of agricultural change. Experience shows that one of the most effective forces for agricultural change in our country as in others is the force of the market. For instance, a well developed market for milk in Khairā District has done more to increase the number of good cattle in the district than years of activity by animal husbandry technicians. It is precisely because of the power of the market and price incentive that this development has taken place. Similarly, in recent months and years there has been an increasing awareness of the need for fertilisers, new varieties of foodgrains and so on, it is

precisely because the farmer knows that he will get an adequate return for his crop and that there is a good demand for it. We have to exploit this economic factor in our favour.

A beginning is being made in some of the districts of Andhra Pradesh with a scheme to advance fertilisers, pesticides and seeds against a contract for sale to Government or governmental agency. I understand that a similar scheme is being adumbrated in Maharashtra State also. This is of crucial importance as an innovation in agricultural administration. A barter of fertilisers for grain is the surest way in which the farmer can be encouraged to take fertilisers and at the same time Government can ensure him a market for grain at reasonable prices. I think the co-operative movement of the country which is today hide-bound and does not attempt any innovations should break loose from its intellectual stagnation. It should boldly experiment with the new approaches to the problems of the current agricultural revolution. It is unfortunate that there is a tendency in those who lay down the law for the cooperative movement to view it more as a problem of banking than as an instrument of agricultural change. I believe basic changes are needed in the structure and procedures which control the flow of agricultural credit. This is too big a subject on which to venture observations in detail in this Seminar. I would, however, make one observation that so long as the present tendency to keep credit and marketing in water-tight compartments continues, there is no healthy future for the cooperative movement. Even historically, credit and market have always gone together. That is the way the money lender has flourished in all backward societies. If the cooperative movement has to replace him and ensure adequate credit at reasonable rates of interest, it can do it only on the basis of a proper integration of credit and marketing. I hope that in the days to come, we will be able to give the needed new orientation to the cooperative and other credit organisations in the country.

Before I conclude, I would like to touch on the relationship between research and the field. For too long, there has been a feeling that research in India is an ivory tower function. From my knowledge of research workers and research work, I can assure this gathering that they have been functioning quite closely

in response to the demands of the situation. If the new fruits of research have to be transmitted to the cultivator it can happen only if the cultivator can be assured that the research worker will be available to solve his problems when they arise. From this point of view, I commend the work done by some of the research workers of the Indian Agricultural Research Institute in organising demonstration work in the nearby village of Jounti. I hope and trust that the research stations of the State Governments will also develop a similar vital and organic link with the problems of extension and the farms in the nearby areas.

I am glad you are discussing the important problem of Union-State relationships. Ultimately, the responsibility for implementation of agricultural plans rests with State Governments. The Centre can only act as a guide and if I may so put it, as an instigator of new changes. It can offer the carrot of grants and loans. In a permissive federal State like India, resort to sanctions is not only undesirable but unnecessary. We have to work within the constraints of the federal system and to see that the State Governments and the State administrations are motivated by the same incentives to progress as the Centre. It is, in fact, an illusion to think that the States are not as eager as the Centre to make an advance. I would put it that some of the States want to move much faster than the Central Administration is prepared to move. It is part of the process of democracy that we have to make adjustments and take the laggards with us but in this process we should see to it that those who want to proceed faster are not held back. We are evolving memoranda of understanding between the States and the Centre which would in a large measure enable a clear definition of responsibilities and obligations of the Centre and the States in the various agricultural development programmes. I am hoping in due course this will become a useful instrumentality in agricultural development.

It is not merely in the sphere of Centre-State Relations that the fixing of responsibility is important. It is equally necessary at every level of the administration. The ultimate responsibility for action or inaction is now difficult to fix. If there is success, no body gets credit and if there is failure no one can be held responsible. This is not the way to get the best out of the

administrative system. To fix responsibility on particular individuals for particular tasks is important. If an officer discharges his responsibility successfully he can be rewarded but if he fails, taking into account the complexities of the situation, we have to judge if he has done a good job under the circumstances, and if his failure is because of his incapacity, he should be made to pay the price for it. This is essential to the success of any administration.

With these few words, I have great pleasure in declaring open this Seminar. This is indeed a feast of thought and reason in the papers that have been spread out before you. I hope that the deliberations will be fruitful and will enable the emergence of concrete measures for the improvement of agricultural administration in the country.

CONCLUDING ADDRESS

ASOKA MEHTA

Mr. Chairman and friends: I am happy that you had the privilege of being exposed to stimulating ideas by a group of men who are intimately concerned with formulating a whole complex of new policies. The policies which are being enunciated here have to be worked out in detail in consultation with officers in the States, at the headquarters as well as those in the districts. It is, therefore, necessary from time to time to provide ourselves with opportunities like this when free and frank discussions can take place and those who initiate policies here know the kind of reaction that their suggestions are likely to receive from you in the light of your own experience and you in turn are able to enquire in an uninhibited manner into the wisdom of the new initiatives that are being suggested. After four days of stimulating discussions there is hardly anything new that can be added. I would like to invite your attention to a few things which I am sure you have already considered very carefully.

It is obvious that whatever we could achieve within the traditional bounds of agriculture we have already achieved. Whatever we now seek to achieve requires change, extending beyond the traditional bounds and introducing elements of modernisation increasingly in our agriculture. This does not mean that our agriculture so far has been completely traditional and only from now on modern elements will be injected in it. Nor does it mean that when we seek modernisation we will not still be depending to the extent that it is possible on traditional methods and practices.

A great deal of thinking has been going on as to how to modernise our agricultural practices. I have no desire to list the various elements that go into it. But the whole strategy of modernisation having been worked out, the next question is, where do you start?

Can you hope to do this simultaneously everywhere or do you select certain strategic areas and concentrate on them? The process of modernisation means that the resources that exist have to be tapped. There are large resources, natural and human, in the country and over a period of time, all these resources have to be tapped. Modernisation of any process means injection of new schemes, provision of new tools, evolution of new techniques and bringing into operation those resources which may be only potential. This obviously cannot be done everywhere at the same time. So it is being suggested that we have not a thinly spread effort but varied efforts that may be concentrated in certain areas. The selection of these areas naturally depends upon the existence of resources, which can be utilised here and now, not just potential but the actual resources that can be quickly harnessed and that is the reason why one seeks areas where reliable irrigation facilities exist and where perhaps certain amount of knowledge and new practices in agriculture have also grown up. There is no doubt that over a period of time the whole country will be drawn into this process of transformation, but in the short period some areas will receive much greater attention as compared to others. These areas are likely to receive concentrated benefits while other areas may get only partial benefits and often partial benefits do not lead to any immediate consequences. Now these concentrated benefits may be in terms of water, in terms of seed, in terms of communications, in terms of marketing facilities; a whole complex of favourable factors, as it were, brought together in the favoured areas while the areas which are not immediately selected have to carry on with only bits and pieces of the solution. Technically, that is, in terms of the results, this may be very good strategy. It is going to create, however, a considerable amount of difficulties, politically, administratively and otherwise.

One has to be on guard about it, for if you start with this strategy and move only half way because of all kinds of difficulties that come up, then all kinds of opposition may get mounted and the whole process of modernisation is likely to get discredited. The selected areas will be able to exploit the resources effectively and the income generated in these areas will be considerable

The rate of growth in these areas will be much higher than the growth in other areas. Now this rate of growth, therefore, has to make its own contribution. That would be the justification for this kind of a programme which means that cultivators in such areas may be able to increase the incomes very fast. We cannot permit consumption to go up proportionately. The mobilisation of savings from these areas, and particularly public savings, will have to be considerable because it will not be possible to mobilise savings in other areas. A strategy of this kind has certain consequences in terms of public finances, and if we do not take these into account, the strategy will backfire as we are deliberately working for developing faster areas which have already certain advantages than areas less favourably situated. In this process, the vulnerable sections are to be given greater attention, because even here the same kind of logic operates and we concentrate on these elements. These socio-logical criteria and considerations will have to be kept in mind in the field of agricultural administration.

Any administration has two aspects: one is concerned with fulfilling the immediate responsibility; the other is that in fulfilling its responsibilities the administration is able to meet various stresses and strains that are created, various distortions and favourable and sometimes unfavourable factors that emerge. In this framework of administration, constantly self-correcting activities have to be organised and seminars of this kind are useful for understanding what are the kinds of self-correcting activities that are to be taken up. Otherwise a set of administrators, or administrators operating in a segment of their own blocks of administration find themselves unable to understand why certain things are being done; why certain measures are being taken which run counter to what they would like to do within the framework of their own somewhat limited area.

The third point that I would like to bring out is that we are really shifting our attention from output to input. Too long we have talked about output in agriculture. Now we have realised that outputs have a relationship with inputs. When we talk of agriculture, we are looking at the whole set of problems of organising properly material inputs as well as non-material inputs.

The provision of material inputs links with various industries and the whole range of production and supply has to be organised in a manner whereby the needed material inputs will be available at an appropriate time in appropriate quantities and qualities and at prices that the agriculturist will find it worthwhile to accept. This is one area where one has to work out so many things in detail, which we have not had to do in the past. In traditional agriculture the whole problem of inputs was of a limited character. But the non-material inputs, of course, are going to strain the resources of agriculture even more, because it is here that one has to communicate to the millions of agriculturists knowledge of new techniques, knowledge about soil, the new cropping patterns, etc. It is not by material inputs alone whereby agriculture is modernised. The agriculturist's outlook of agriculture has to be changed. Modernisation is like setting out on a voyage of exploration, a voyage of discovery which is endless. There is no ultimate harbour where one has to land and rest permanently thereafter. After a time the agriculturists will learn and the administration also will have to learn the means for communicating new things. Both of us have to learn these new things and in that the active and more stimulating agent has to be the administration.

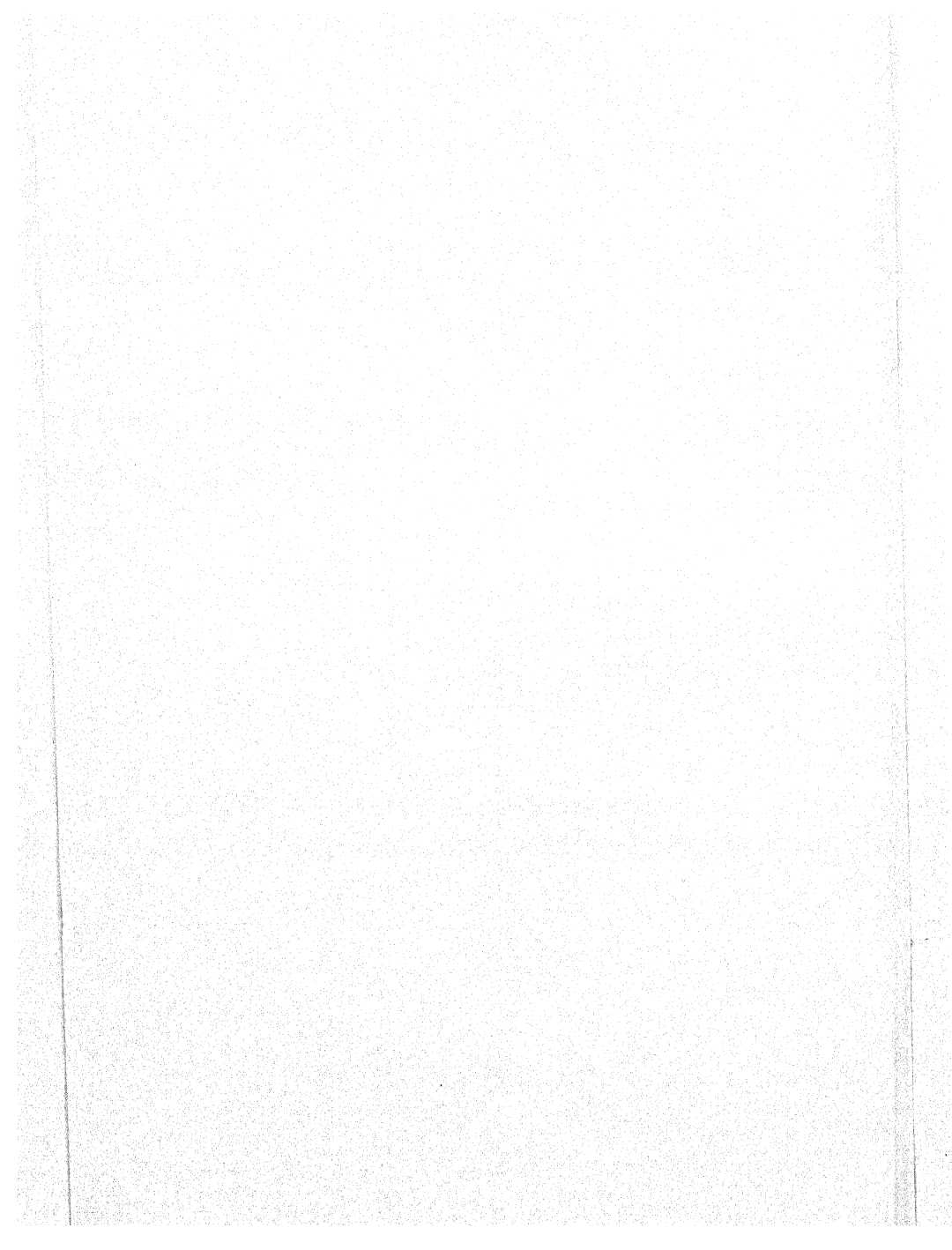
The fourth thing is that besides the changes in techniques and material inputs attention has to be given to work for the development of human resources. I would like to analyse this a little further. The change that we are really working for is a change in the behaviour pattern of the agriculturists as against the traditional incentives of a subsistence economy. We want to impart to the agriculturist modern incentives. The complex of marketing, working for monetary incentives, wanting new kinds of implements and consumer goods and the spirit of competition are against the incentives that go with subsistence economy. To inject a modern competitive economy would be a simple and straight forward thing and can be tried. One can say, we give up the old traditional system and patterns and move towards a competitive, monetary profit seeking pattern. Unfortunately, we cannot simplify things in that way because if we do we shall have to face terrible social strains. When I

was talking about the strategy of concentrating upon some areas and leaving other areas at a little lower level of effort, I said that it would be necessary for those who prosper, those who are better off to make a large contribution in terms of the burdens they carry if the rest of the country is to be carried forward. This cannot be, while there is a competitive spirit. While the new incentives have to be introduced we must emphasise that it will be necessary also to maintain and intensify the sense of social consciousness and community solidarity. I would even state that a sense of social consciousness and a feeling of social solidarity is really the problem today. If we do not emphasise it, we will be disrupting the texture of Indian society. If we try to pull back enterprise, India will remain a stagnant country. Somewhere these two factors have to be balanced. One must be able to combine the whole process of modernisation with a sense of purpose for eradication of poverty.

Administration has to play the role of leader in this. Administrators whether political leaders or officers, unless they are able to show an innovating spirit and sense of solidarity, I am afraid, the whole transformation that we desire will not come about. While seeking to encourage initiative and enterprise, we should be conscious of our fellowmen and feel that our responsibility is to see that one does not prosper by disrupting another. As somebody said, one does not make up a heap by creating a hollow somewhere, we must see that polarisation does not take place. This basic combination has to come about. It is important. I do not know how far attention has been drawn to this point in this seminar. There is no doubt that material inputs have to be created, things made available at economic rates, initiative has to be taken, innovations have to take place and that there has got to be a greater appreciation of efficiency. But usually efficiency and ethics, ethical considerations and efficiency in functioning, are posed as alternatives; people with ethical considerations are supposed to be no good while efficient people are those who achieve results and are result-oriented. The point is that in India these cannot be treated as opposites. These have to go together. Either we work in double harness or we will not succeed at all. Agricultural change is to be regarded

as part of a bigger revolution for economic and social transformation, as we move from a traditional economy and society to a modern economy with a great deal of social and economic equalities inside it. We should try to see that in our thinking and in our efforts we are able to combine efficient functioning and ethical considerations in effecting a transformation of our agriculture.

PART I



THE DIVISION OF POWERS IN THE CONSTITUTION AND AGRICULTURE

N. SRINIVASAN

The division of legislative powers in the Indian Constitution is more detailed than in other federal constitutions and attempts an exhaustive enumeration of them in three legislative lists in the 7th Schedule. The Union and State Lists enumerate powers that are exclusive to the Centre and the States and the Concurrent List enumerates subjects in which States legislate subject to the over-riding power of Union. The enumeration is unique only in being rather more elaborate than in the constitutions of U. S. A., Canada, Australia and Switzerland. In essentials, it is similar. It is based less upon a consideration of the present day needs of government in a Welfare State than upon the traditional view of the division of powers appropriate to a federal state and India's own historical antecedents. Constitutional writers have pointed out that judged by the division of powers which is strongly centripetal India can hardly be considered a federation in the classical meaning of the term. The eminent authority Professor Wheare has described it as a quasi-federation.

Our concern here is not the division of powers in the Indian Constitution in general, but with the powers that relate particularly to the field of agriculture. In the United States and Australia agriculture is within the field of the *exclusive* powers reserved to the States. In Canada, it is one of the two subjects of legislation which are concurrent, federal law prevailing over provincial law in cases of conflict. In Switzerland, powers in relation to agriculture are divided between the federal and cantonal governments. India has followed the constitutions of the United States and Australia in this respect and

placed most of the direct powers in relation to agriculture within the exclusive sphere of the States. It has enumerated these nearly exhaustively in List II. The principal entries are:

- “14. Agriculture, including agricultural education and research, protection against pests and prevention of plant diseases;
 - 15. Preservation, protection and improvement of stock and prevention of animal diseases; veterinary training and practice;
 - 17. Water, that is to say, water supplies, irrigation and canals, drainage and embankments, water storage and water power subject to the provisions of entry 56 of List I.
 - 18. Land, that is to say, rights in or over land, land tenures including the relation of landlord and tenant, and the collection of rents; transfer and alienation of agricultural land, land improvement and agricultural loans; colonization.
 - 19. Forests.
 - 20. Protection of wild animals and birds.
 - 21. Fisheries.
 - 26. Trade and commerce within the State subject to the provisions of entry 33 of List III.
 - 27. Production, supply and distribution of goods subject to the provisions of entry 33 of List III.
 - 28. Markets and fairs.
 - 29. Weights and measures except establishment of standards.
 - 30. Money-lending and money-lenders; relief of agricultural indebtedness.
 - 32. Incorporation, regulation and winding up of corporations, other than those specified in List I, and universities; unincorporated trading, literary, scientific, religious and other societies, and associations; cooperative societies.
 - 45. Land revenue, including the assessment and collection of revenue, the maintenance of land records, survey for revenue purposes and records of rights, and alienation of revenues.
 - 46. Taxes on agricultural incomes.
 - 47. Duties in respect of succession to agricultural land.
- Other entries in the List which may affect agriculture are

many, as for example, all the entries relating to the taxing powers of the States (45-66 List-II); Local Government 5 ; Public Health 6 ; Education 11 and Communications 13 (List II).

The Centre's powers to deal with agriculture are in part indirect and are derived from its exclusive powers enumerated in List I and in part direct and enumerated in List III. These powers are quite extensive and make agriculture a joint field for the Centre and the States, rather than the exclusive preserve of the States.

The principal entries in List I are:

- “7. Industries declared by Parliament by law to be necessary for the purpose of defence or for the prosecution of war.
- 13. Participation in international conferences, associations and other bodies and implementing of decisions made thereat.
- 14. Entering into treaties and agreements with the foreign countries and implementing of treaties, agreements and conventions with foreign countries.
- 22-25. Entries relating to transport.
- 30. Carriage of . . . goods
- 41. Trade and Commerce with foreign countries
- 42. Inter-State trade and commerce.
- 45. Banking.
- 47. Insurance.
- 51. Establishment of standards of quality for goods to be exported out of India or transported from one State to another.
- 52. Industries, the control of which by the Union is declared by Parliament by law to be expedient in the public interest.
- 56. Regulation and development of Inter-State rivers and river valleys to the extent to which such regulation and development under the control of the Union is declared by Parliament by law to be expedient in the public interest.
- 64. Institutions for scientific or technical education financed by the Government of India wholly or in part and declared by Parliament by law to be institutions of national importance,

65. Union agencies and institutions for:
 - (a) professional, vocational or technical training, including the training of police officers; or
 - (b) the promotion of special studies or research; or
 - (c) scientific and technical assistance in the investigation or detection of crime.
66. Coordination and determination of standards of institutions for higher education or research and scientific and technical institutions."

Concurrent Legislative Powers in a federal system are really federal powers in the ultimate analysis. They are best regarded as Professor Wheare has observed as delegated powers since States legislate in the field with the consent of the Centre. These powers are quite extensive in most federations. In List III of the Indian Constitution there are entries of exceptional importance which would enable the Centre to assume wide powers in the field of economic and social development.

"9. Bankruptcy and insolvency.

17. Prevention of cruelty to animals.
18. Adulteration of food stuffs and other goods.
19. Drugs and poisons.
20. Economic and social planning.
22. Trade union, industrial and labour disputes.
23. Social security and social insurance; employment and unemployment.
24. Welfare of labour including conditions of work, provident funds, employers' liability, workmen's compensation, invalidity and old age pensions and maternity benefits.
25. Vocational and technical training of labour.
26. Legal, medical and other professions.
27. Relief and rehabilitation of persons displaced from their original place of residence by reason of the setting up of the Dominions of India and Pakistan.
29. Prevention of the extension from one state to another of infectious or contagious diseases or pests affecting men, animals or plants.
32. Shipping and navigation on inland water ways.

33. Trade and commerce in, and the production, supply and distribution of:
 - (a) the products of any industry where the control of such industry by the Union is declared by Parliament by law to be expedient in the public interest, and imported goods of the same kind as such products;
 - (b) food-stuffs, including edible oilseeds and oils;
 - (c) Cattle fodder, including oilcakes and other concentrates;
 - (d) Raw cotton, whether ginned or unginned and cotton-seed, and
 - (e) Raw jute.
34. Price control.
36. Factories.
38. Electricity.
42. Acquisition and requisitioning of property.
43. Recovery in a State of claims in respect of taxes and other public demands including arrears of land revenue . . .
45. Inquiries and statistics for purposes of any of the matters specified in List II and List III."

Part XI of the Constitution (Articles 245 to 263) regulates the legislative and administrative relations between the Union and the States and Part XII (Articles 264 to 300) determines financial relations. Part XIII (Articles 301 to 307) relates to Inter-State trade and Part XIV deals with all-India public services. These parts contain the most important provisions of the Constitution from the point of view of Union-State relations. Part IV of the Constitution setting forth the Directive Principles of State Policy, though not enforceable through courts, may prove to be potentially a source of power for the Union in relation to agriculture as well as to other fields in the same way as the omnibus "general welfare" clause of Section 8 of the U.S. Constitution.

An interesting feature of the Constitution are the provisions intended to facilitate action by the Centre when necessary in the public interest and to make it a flexible instrument of government. These are Articles 248, 249 and 250. Article 248 empowers the Union Parliament to legislate on any subject in the State List at the request of two or more States. Such a law,

however, would become operative only after its adoption by the Legislatures of the States making the request. By Article 249 the Rajya Sabha has been given power to authorise Parliament to legislate on any subject in the State List, if it is considered "necessary and expedient in the national interest" by a resolution adopted by a two-thirds vote of those present and voting for periods not exceeding a year. By Article 250 Parliament is enabled to legislate over the entire field of State subjects in an emergency.

These provisions render the constitutional distribution of powers in some measure flexible. But their use to strengthen the Centre in regard to everyday subjects is likely to prove rather difficult. Under Article 312, the Rajya Sabha could by a resolution adopted by a two-thirds vote empower Parliament to create all-India services if such a step is considered to be "necessary and in the national interest". The resistance of the States which are jealous of their autonomy makes resort to this provision difficult as is seen from the still incomplete attempt to recreate all-India services in the fields of education, agriculture, medicine and engineering.

In the light of this experience it would appear to be unrealistic to place much reliance on these provisions to strengthen the Centre and increase its competence to deal with the new situations that may arise.

The provisions of the Constitution (Article 262) empowering the Centre to deal with inter-State disputes relating to waters would seem to be adequate. Yet in practice this has not been conspicuously successful in dealing with the administration of multipurpose river valley projects for the development of irrigation, flood control and power in the face of State autonomy and claims.

The Constitution provides for the setting up of an Inter-State Council charged with the duty of :

- “(a) inquiring into and advising upon disputes which may have arisen between States;
- (b) investigating and discussing subjects in which some or all of the States, or the Union and one or more of the States, have a common interest, or;

- (c) making recommendations upon any such subject and, in particular, recommendations for the better coordination of policy and action with respect to that subject."

The provision has not been used. Instead non-statutory bodies and informal conferences have been made use of to deal with affairs common to the States and the Centre. Whether a constitutional authority or such extra-constitutional bodies are the more appropriate institutions for the purpose is a debatable question.

Financial relations between the Centre and the States have been dealt with at length by the Constitution in Part XII consisting of Articles 264-300. The powers of taxation of the Union and the States are defined and resources allocated by these clauses and provision is made for a Finance Commission to be set up every five years to lay down the principles and recommend the allocation of funds by the Centre among the States.

From the point of view of the States the tax resources assigned to them are inadequate to meet their responsibilities and make them unduly dependent on the Centre. A transfer of funds from the Central Exchequer to the States has been the normal means of enabling States to fulfil their responsibilities. Their autonomous powers of taxation and borrowing have been severely limited and the resources they could raise inadequate for the performance of their functions. There is an imbalance between their resources and functions.

This is remedied in part by the assignment of the proceeds of taxes levied and collected by the Centre by Article 269, by the compulsory division of the proceeds of the Income-tax (Article 270) and by the division of the Union excise duties as approved by Parliament (Article 272) and by grants-in-aid under Article 275 on the basis of the recommendations of the Finance Commission accepted by Parliament and discretionary grants under the general power of the Centre to make such grants under Article 282 for any public purpose.

Since the acceptance of a policy of planned economic development the grants-in-aid under Article 275 have been overshadowed by grants under Article 282 under which plan schemes in the States as recommended by the Planning Commission are

financed. The Fourth Finance Commission has rightly declined to bring plan expenditure within the purview of its recommendations as has been demanded by the States.

"The importance of planned economic development is so great and its implementation so essential that there should not be any division of responsibility in regard to any element of plan expenditure."

It has been argued with some measure of truth that the dependence of the States on the Centre has been increased. On the other side, it has been pointed out that this is the only real power that the Centre has to induce the States to shape their development schemes to fit in with the national plan of development.

The provisions of the Constitution on administrative relations between the Union and State Governments (Articles 256-263) place on the State Governments the obligation of securing compliance with Union laws and empowers the Union Government to issue necessary directives to the State Governments for the purpose. State Governments are required to exercise their executive power so as not to impede or prejudice the exercise of the executive power of the Union. The Union Government could issue directions to State Governments to secure compliance. The Union Government could further issue directions to State Governments as to the construction and maintenance of means of communications of national or military importance and measures for the protection of the railways. The Union Government is empowered to entrust its executive powers to the State Governments or State officers and State Governments may similarly entrust its executive powers to the Union Government. The Union and State Governments could act as agents of the other as circumstances may require.

The broad result of the Articles in Parts XI, XII, XIII and XIV of the Constitution and the enumeration of powers in the three legislative lists is, therefore, to emphasise the autonomy of the States in the field of agriculture, as well as in other spheres. But it is not an absolute autonomy but one that is limited in several ways. The exercise by the Union of its powers in the Union and Concurrent Lists could severely restrict the ambit

of the States' exclusive control of matters connected with agriculture. Price control, marketing, international trade, interstate trade, social and economic planning, banking and credit, the control of foreign exchange, standards of education and industries, Union powers of taxation and others can indeed reduce State autonomy to negligible proportions. The financial powers of the Union, in particular its command over most of the elastic and productive sources of revenue may leave the States without the means of making an effective use of their autonomous powers.

It will be observed that the division of powers and responsibilities between the Union and States is not wholly consistent in logic. It has been rightly pointed out that there is "no consistent theoretical reason for putting the regulation of mines and mineral resources and the development of oil fields (and several others) in the national jurisdiction and putting public health and agriculture exclusively in the jurisdiction of the States".¹

Health is a national problem. So is education. "Neither agriculture nor fisheries has greater local significance than national, if as much. In a nation dedicated to the welfare state ideal, the food supply and the welfare of farm families are inescapably national responsibilities.... Almost all economic activities are carried on in localities, but this fact does not make their significance local. The constitutional effort to specify scopes of national and state powers so precisely would appear to raise the most serious barriers before national needs to develop and execute national programmes in the interests of the national economy and the national public."² The writer concludes that the Government of India has been given "less basic power than any other important nation, while at the same time having rather more sense of need and determination to establish programmes dealing with matters important to the national interest."³ This seems to be particularly true in the case of agriculture.

The lack of power would appear to be due not so much

¹ Paul H. Appleby: *Public Administration in India* 1953.

² *Ibid.*, p. 17.

³ *Ibid.*, p. 17.

to the fact that a power to legislate is wholly lacking, as to divided jurisdiction over closely associated fields and the divided responsibility that results from it. This is perhaps inescapable in a federal system. The difficulties which arise are the inability of the governments—National or State adequately to deal with the complex problems they have to solve under modern conditions. No problem in agriculture can be solved singly by either the Union Government or by State Governments. No great national problem such as the food problem or increased agricultural productivity or the relief of agricultural indebtedness can be solved without the initiative of the Centre and the cooperation of the States. Even a plan for solving a problem cannot be made without the two levels of government consulting together and its implementation is dependent on cooperative action. The difficulties are indeed of the same character as those under dyarchy of which this country has had considerable experience. Any programme would need for its implementation the close cooperation and concerted action by both levels of government. This is, by no means, easy to achieve in a federal system where the claims of regional autonomy are in conflict with national needs and is the heart of the problem of modern federalism.

That this is so in other federal countries as much as in India will be evident from the following words from the Report of Rowell-Sirois Commission of Canada:

“In the highly interdependent and complex society of today with the great expansion of governmental function which has become necessary, efficiency and economy in government cannot be obtained merely by a division of powers between Governments. Cooperation in the pursuit of common objects and in the solution of common problems is no less essential. But cooperation between autonomous governments is difficult to achieve. Administrative authorities responsible to different legislatures are not always interested in cooperation; indeed non-cooperation may on occasion better serve their immediate interests. Autonomous governments may thus tend to become rival

centres of power rather than agencies for the cooperative pursuit of the common weal.”⁴

It has been stated that historical antecedents rather than any view of the current needs of government determined the division of powers in the Constitution. The Indian Federation is the result of a devolution of powers from an all-powerful Centre to its administrative sub-divisions, whose aim was to satisfy the demand for autonomy of nationalists, while retaining the essential core of power in its own hands by India's Foreign Government. Powers that would be needed by the Centre for the fulfilment of large national programmes of development as distinguished from powers required to maintain intact a Foreign Government were hardly thought of when the Constitution Act of 1935 which completed the process of devolution was framed. The abolition of the all-India services in all development departments like engineering, education, forests while retaining the Indian Police and Civil Services and strengthening them in the wake of the Reforms of 1919 is significant in this context. Nor does it appear that in framing the new Constitution the Constituent Assembly took full cognisance of the changed objective of development under independence. Except for the rather casual addition of economic and social planning in the Concurrent List there is no evidence of any conscious attempt to shape the Constitution to the needs of a positive welfare state.

The division of powers is ultimately dependent upon judicial interpretation as well as upon their actual operation by the Union and State Governments. A distinguished observer of the working of the Indian Constitution has noted that there is as yet “a lack of evidence that interpretational and operational discretion is opening the door to a strengthening of the Centre's potentialities in the administration of programmes essential to social well being”.⁵

The elaborate listing of powers has by no means eliminated the possibilities of confusion and difficulties of definition as, for instance, “public interest” and other such terms or doubts

⁴ Rowell-Sirois Report on Dominion-Provincial Relations, Vol. II, p. 68.

⁵ Paul H. Appleby, *op. cit.*

about the significance of the directives of state policy included in the Constitution. Such precise listing also makes for a certain rigidity and leads to difficulties in meeting new situations as they arise.

The major question to be answered is how far the division of powers under the Constitution is an impediment to the formulation of national policies and their effective implementation generally and, in particular, in the field of agricultural development? The formulation of policy is rendered exceedingly difficult by the accent on the autonomy of the States in a field where powers, duties and responsibilities are intermeshed. A national policy for food, increasing agricultural production, changing crop patterns, research, manufacture of the inputs needed, a price policy and others is difficult to evolve in the face of the regional claims pressed by autonomous States. A consensus of the States becomes possible only when the conflicting claims of the States can in some way be reconciled. There are no formal channels for the resolution of the conflicts. What is at present available is the informal means of conferences and mutual persuasion between the representatives of the Centre and the States. And these together with the discipline of the party system have been the means of Central Policy formulation. If the Constitution does not provide the means for the formulation of national policies by vesting the Centre with the necessary powers neither does it place any insuperable obstacles to the informal arrangements for making national policy. Except perhaps shifting a number of entries from the State List to the Union or Concurrent List, as for instance, the relief of agricultural indebtedness, price control, social insurance, no major constitutional change would seem to be needed. These are best transferred to the Union Government which alone has the financial resources or is otherwise adequately equipped for their proper exercise.

It is in the area of implementation of policies and programmes, that divided jurisdiction has led to failure and frustration. Action in the directions planned and at the pace necessary in the execution of projects is not often secured because of divided powers. Planning is done at the Centre, and execution is left to the States, which can neither be directed, ordered or

coerced, and can only be persuaded. The problem of implementation can be solved at least in part by the establishment of a federal administration in the field for the implementation of federal policy and programmes as has been done in U.S.A. Its costs would be heavy for this country. It will swell the numbers of the bureaucracy and increase its dangers. There is no assurance that the execution of federal programmes would be speeded up thereby in the absence of vast improvement in the quality of administrative personnel and a rationalisation and streamlining of administrative procedures. The States must continue to be the main instruments for the implementation of development programmes. This is both inevitable and necessary, because it is the intent of the Constitution and is democratic. It is by no means impossible to devise appropriate institutional arrangements and techniques and procedures for coordinating Central and State policies for agricultural development and to secure their implementation. The solution of the problems of Centre-State relations in the Indian federal system has to be sought along these lines.

THE GROWTH OF THE MINISTRY OF FOOD AND AGRICULTURE

N. SRINIVASAN

I. HISTORY

Governments took little interest in the problems of agriculture before the mid-seventies of the 19th century. They were pre-occupied almost exclusively with problems of revenue, police and judicial administration. It was the great Bengal and Orissa famine of 1866 and the experience of organising relief that forced the attention of the Government to the need for the development of agriculture as a means of averting famines and mitigating the hardships of the people. The first proposal to constitute a special department of agriculture at the Centre was put forward by the Commission appointed in 1866 following the severe famine of the year but was turned down as premature. The proposal was repeated in 1869 by the Manchester Cotton Association and led to the serious consideration of the subject by the Government. The result was the establishment in 1871 of a Department of Revenue, Agriculture and Commerce as a branch of the Secretariat of the Government of India. It was a first step as "it was recognised that provincial departments of agriculture must form an essential part of any scheme of agricultural development".¹ The Department had, however, a very brief existence and was merged in the Home Department in 1879 for reasons of financial stringency. Its only achievement was to evolve a system for the collection of agricultural statistics and other data.

The Report of the Famine Commission of 1880-1881 strongly urged the revival of a separate department of agriculture in the Central Secretariat and the simultaneous establishment in all the provinces, of departments of agriculture with large subordinate establishments as a long-term remedy for recurrent famines. As

¹ Report of the Royal Commission on Agriculture, 1928, para 13. The history of the Department given here follows the Report.

a consequence a separate department of Revenue and Agriculture was revived in the Central Secretariat in 1881. It was fully realised even in the initial stages that "without a provincial agency, no programme of agricultural improvement which emanated from headquarters could be productive of tangible results,"² that the main responsibility for agricultural research and experiment must fall on provincial government"³ and all that the Centre could do was to give a general lead. The new department was directed to take up into consideration immediately the question of the form to be given to provincial departments. Between 1881 and 1891 the departments were largely engaged in conferences and investigations "to discover the lines of development best suited to their needs".⁴

Provincial departments of agriculture were established in the U.P. (then known as the N.W. Provinces), Bombay, Bengal, Madras and C.P. between 1875 and 1905. Their functions were rather narrowly defined by the Government of India and consisted largely of the collection of statistical and economic data. "There was some research, notably in Bombay, and a few sporadic experiments in the cultivation of American Cotton, groundnut, potatoes and fruit in some provinces. But no great progress could be made by such efforts in the absence of the solid basis of a sound policy and an efficient organisation."⁵

It was also realised very early by the Secretariat that without technical advice no advance was possible. Dr. J. A. Voelcker, a distinguished agricultural chemist, was brought over to India in 1889 to conduct an enquiry into the character of the soils and agricultural conditions. This is regarded the "first serious step to frame a policy of agricultural research suited to the conditions of India".⁶ This was followed by the appointment in 1892 of specialists for agricultural research and education. In 1891, an Inspector-General of Agriculture was appointed with advisory functions. His duties were specified as "the systematic

² Report of the Royal Commission.

³ *Ibid.*, para 15 on Agriculture in India, 1928, para 15, p. 17.

⁴ *Ibid.*, para 15.

⁵ *Ibid.*, para 17.

⁶ *Ibid.*, para 15 (18).

study of Indian agriculture, its conditions and remediable defects; the supervision and development of provincial agricultural departments; the establishment of improved agricultural methods and new staples and generally the direction of the agricultural policy of the government".⁷ An Imperial Mycologist and an Entomologist were added to the department in 1901-3. Among the developments of this period mention should be made of the establishment of the Imperial Institute of Veterinary Research in 1889 and the Botanical and Zoological Surveys in 1890.

The Report of the Famine Commission of 1901 inaugurated the next great period in the growth of agricultural departments. The Commission recommended a strengthening of the scientific staffs of agricultural departments and legislation to set up mutual credit societies. During Lord Curzon's viceroyalty (1898-1905) these recommendations were implemented and agricultural departments were thoroughly reorganised. There was an expansion of the scientific staffs of the departments and of their activities. With the setting up of the Imperial Agricultural Research Institute at Pusa and the scientific staff of the department brought together under a single roof, organised agricultural research may be said to have begun in this country. Directors of Agriculture were appointed in all the provinces. Circles were marked out and placed under deputy directors who were responsible for experimental seed, and demonstration farms within their jurisdictions. Agricultural colleges were reorganised and research stations and experimental farms were also set up. The Imperial Agricultural Service was constituted in 1906. Altogether the years from 1905 to 1914 were years of the steady growth in agricultural research and education and other services. The substantial advances made during these years by Provincial Departments were largely due to the stimulus and guidance of the Centre and grants made by it.

The war of 1914-18 halted further progress. In the period immediately after the Reforms of 1919 there was an initial setback. Agriculture was a transferred subject and formed part of the responsibility of combined departments of Education,

⁷ *Op. cit.*, Para 15 (19).

Health and Lands at the Centre since 1923 and of composite development departments under ministers responsible to provincial legislatures in the Provinces. Recruitment to the Indian Agricultural Service ceased in 1924. The Centre ceased to co-ordinate and direct research and experimental programmes of provincial agricultural departments. Till 1928 the only notable steps in advance were the setting up of the Indian Animal Husbandry and Dairy Research Institute in 1923, cattle breeding stations at Karnal, Wellington and Anand; the Institute of Veterinary Research at Mukteswar and of the Indian Central Cotton Committee in 1923.

The appointment of the Royal Commission on Agriculture in 1926 is evidence of a renewed interest in agricultural development following its transfer to popular control. Based on the most comprehensive study yet undertaken the recommendations of the Commission covered every aspect of agricultural improvement: research, education, soils, fertilizers, improved seeds, implements, pest control, agricultural demonstration, animal husbandry, irrigation, credit, marketing, cooperation, etc. They constitute a blue-print for the all round development of agriculture and the improvement of rural life. The development of agricultural departments and their activities till the present has been mostly on the lines laid down by the Commission, despite the political changes that have taken place in the country.

The major developments between 1928 and 1947 will be briefly indicated here. The Imperial (now Indian) Council of Agricultural Research was established in 1928. Its primary function was "to promote, guide and coordinate agricultural (including veterinary) research in India".⁸ The Pusa Institute was reorganised and equipped with the necessary specialist staff to undertake higher agricultural research and training. Greater finances were made available to agricultural departments to undertake work in all fields of agricultural improvement.

An agricultural marketing adviser was appointed at the Centre and agricultural marketing officers in the Provinces in 1935. A statistical adviser and an adviser on irrigation and

⁸ Report of the Royal Commission on Agriculture in India, para 43.

fisheries were appointed in 1944. A number of Commodity Committees came into existence : jute, tobacco, coconut, oil seeds, etc., on the model of the earlier Central Cotton Committee. A Central Rice Research Institute (Cuttack), and Central Inland Fisheries Institute (Mandapam) were established. From the point of view of the development of administrative machinery the most important event, however, was the creation in 1943 of a Department of Food and in 1945 of a Department of Agriculture.

The Central Government was compelled by the food crisis of the years following the shortage of imports of rice from Burma in 1942 to assume increasing responsibilities in regard to food production and supply including the control of prices, procurement, movement and distribution of foodgrains and other agricultural commodities. Following the Bengal Famine of 1943 food became a major concern of the Central Government, the inauguration of a Grow More Food Campaign was the immediate answer to the food crisis. Under the G.M.F. Campaign the Central Government undertook to assist the provinces by grants-in-aid and loans in carrying out schemes of land reclamation, minor irrigation, drainage, the provision of agricultural inputs like improved seeds, fertilisers and implements. The Centre also began to arrange for expert advice and to guide and coordinate the policies of the provinces for increasing agricultural production. It added to its staff expert advisers on fertilisers, irrigation, fisheries, dairying and livestock utilisation.

The new functions which the Centre took over during the food crisis of these years—a countrywide Grow More Food Campaign; schemes of irrigation and drainage and ground water survey; the supply of inputs like fertilisers, manures, compost, etc.; the allocation of steel, cement, fuel, oil; plant protection and land reclamation through a Central Tractor Organisation;—have become normal Central responsibilities. This trend has continued after Independence and the Centre's responsibilities have further increased under the stress of chronic food shortage since 1943 and the policy of planned economic development that has been adopted since 1951. The activities of the Central Government in

relation to agriculture at present may be summed up as follows:

- (1) The planning of agricultural development jointly with the Planning Commission;
- (2) Coordinating state agricultural plans, watching their implementation and evaluating performance;
- (3) Providing financial assistance to States for their agricultural schemes by way of grants-in-aid and loans;
- (4) Ensuring the supply of agricultural inputs such as improved seeds, implements, fertilisers, etc., in sufficient quantities and in time;
- (5) Providing credit and facilities for marketing, storage, and transport of produce;
- (6) To provide economic incentives to farmers in the form of remunerative prices and enforcing the minimum and maximum prices;
- (7) Extension work among farmers and extension education to make farmers receptive to scientific farming practices;
- (8) Providing technical advice and assistance to States in implementing programmes;
- (9) Development of livestock, dairying and fisheries;
- (10) Development of forests;
- (11) Land reclamation, soil conservation, utilisation of water resources;
- (12) Fundamental and applied research in agriculture, veterinary science, forestry, agricultural economics, fisheries etc.; maintaining the standards of higher education;
- (13) Home Science and nutritional needs of the population; and
- (14) The administration of external assistance.

The development of the machinery of administration has been parallel with the growth of its functions. New ministries or other agencies have been created at the Centre to deal with agriculture and allied subjects. These are the Ministries of Irrigation and Power and Community Development and Cooperation, the latter of which is now a part of the Ministry of Food and Agriculture and the Planning Commission. Separate and new organisations have been established to deal with the variety of

subjects such as research, education, extension, agricultural prices, economics and statistics, etc., and with the administration of programmes of improved seeds, fertilisers, implements, land reclamation, soil conservation, tubewells, dairy development, fisheries, forests, plant protection, etc. There are more than a score of attached or subordinate offices in the Central Ministry. The functions of these bodies are mostly executive though a few have an advisory role.

The growth in the staff and budget of the Ministry is a measure of the expansion of the Ministry that has taken place. The Central Secretariat of the Ministry employs at present a staff of over a 1,000,⁹ a good number of these are technical personnel. Including the attached and subordinate offices throughout the country the total employees number about 14,000. For a country of the size of India and the variety and magnitude of problems to be handled the number cannot be considered excessive.

The total expenditure of the Ministry of Food and Agriculture in 1947-48 was Rs. 191 lakhs. It rose to 233 lakhs in 1951-52. In the first year of the First Five Year Plan it was 1987 lakhs which represents an eight-fold increase over the last year before the Plan. During the Second Plan period the expenditure of the Ministry averaged 2,120 lakhs a year. It went up further under the Third Plan. In 1966-67 the expenditure of the Ministry, including the Departments of Food, Agriculture, Community Development and Cooperation was Rs. 6,522 lakhs.¹⁰

The expansion in the size of the Ministry and scope of its activities have been criticised on the ground that it is incompatible with a federal system of government. It has been stated that since agriculture falls essentially within the ambit of the States and the Centre's role is mainly one of coordination, an elaborate structure of administration at the Centre is unnecessary. This view is based on a misconception and neglects wholly the development of federal government during the last hundred years. In all federations the Centre plays a crucial role in promoting agricultural development. Federal agricultural activities in the three

⁹ Figures for 1966-67.

¹⁰ Source : Budgets for the years 1947-48 to 1966-67.

major federations in the world, *i.e.*, U.S.A., Canada and Australia are in fact wider than they are in India today. It is significant that the functions latterly assumed by the Centre in India are almost identical with the functions exercised by the federal governments in these countries. Such a development does not conflict in any manner with the provisions of the Constitution.

It should be noted that the expansion of the Central Ministry has occurred in response to the need for meeting urgent problems as they made themselves felt, and is not based on any systematic and rational plan. Its growth has been, therefore, somewhat haphazard. It is a vast and sprawling organisation. In its several divisions and in allied departments or attached offices there is some duplication both of staffs and functions. At the top the Minister and Secretary lack high-level technical staff assistance to be able to make the right decisions on vital issues of policy and planning. By and large technical experts and scientists on whose knowledge and experience development so largely depends, are in subordinate positions *vis-a-vis* the personnel of the administrative services. The staff of the Ministry for programme planning and execution is not sufficiently equipped with technical expertise. The instruments for inter-ministerial, and inter-state coordination appear to be ineffective to a great extent.

The control of scientific research was till the recent reorganisation of the Ministry dispersed between the Ministry proper, the ICAR and a number of research institutions. The organisation for extension is inadequate and would appear to be somewhat overstaffed at the Headquarters, and understaffed in the field where it is most needed. There has not been adequate delegation of financial and administrative powers as in other parts of the governmental machinery. The day-to-day financial control is meticulous and tends to blunt financial conscience of the department rather than to foster a sense of financial responsibility. The deficiencies of the machinery of agricultural administration at the Centre are no different from those of other administrative ministries of the Government of India.

A number of committees have investigated the machinery of agricultural administration at the Centre either separately or as part of a more general survey of the whole machinery of

government. Mention may be made of the Patel Committee (1945-46) as a result of whose recommendation the Directorate of Economics and Statistics became a separate unit of the Ministry; the enquiry by N. Gopalaswami Ayyangar (1949) which recommended the creation of Bureau of Natural Resources and Agriculture with a coordinating minister for the Ministries of Agriculture, Food and Works;—the W.R. Natu Enquiry 1951 and more recently the enquiry by Mr. Kiefer (1965). Full scale general enquiries have also been made of the machinery of the Government of India leading to proposals for its reorganisation by Richard Tottenham in 1945, by Shri R. A. Gopalaswami in 1952 and Dr. Appleby in 1954. It may also be mentioned here that the Food Grains Policy Committee 1947, the Grow More Food Committee 1952 and the Balwantrai Mehta Committee 1957 and others also have made recommendations for the reorganisation of the machinery of agricultural administration at different levels. The desire for administrative improvement has been continuous, the suggestions for reform numerous, but the practical results of the enquiries have been rather disappointing. Piecemeal changes and adjustments have been made from time to time. There has been some bureau shuffling, but no thorough reorganisation that assures the efficient functioning of the machinery in achieving its purpose of accelerating development.

II. THE MACHINERY OF ADMINISTRATION

The agencies most directly concerned with agricultural development are the Ministries of Food and Agriculture, Community Development and Cooperation and Irrigation and Power. The Planning Commission and the Ministry of Finance are both intimately involved in agriculture and play a crucial role in its development. But the main responsibility in the field, both of planning and implementation lies with the Ministry of Food and Agriculture. In what follows the Central Ministry will be our main concern. We shall have to examine whether for the many functions it has to undertake in the field of agriculture, it is adequately equipped.

The Ministry was reorganised in 1964 on the initiative of the then Minister of Food and Agriculture who had found it a poor instrument for carrying out a dynamic and forward looking policy aimed at making the country self-sufficient and even surplus in the foodgrains and assuring the prosperity of the farming population. The reorganisation was aimed at making the Ministry "function more effectively and to enable it more actively to associate itself with the implementation of development schemes by the States".¹¹ It attempted: (i) a redistribution of subjects and responsibilities among the various units of the Ministry so as to make the assignments of the units compact and specific; (ii) to assign to scientific and technical officers of the Ministry executive functions and operational responsibilities for planning, implementation and supervision of programmes, in addition to their advisory functions, to secure through "better administrative machinery"; (iii) closer and more continuous contact between the Central and State Governments in the implementation of agricultural plan schemes and to improve Centre-State relations.¹²

The apex of the structure of administration consists of the Minister of Food and Agriculture, who is a senior member of the Cabinet, Ministers of State and Deputy Ministers, who constitute the political executive. The Secretary of the Ministry is the official head of the Ministry and the principal adviser to the Minister. The Department of Agriculture which is one of the three departments included in the Ministry is organised in eight wings, and has besides five specialised offices, a number of supervisory and operational agencies and some cells and units for certain specific purposes.

The eight wings of the Department are: (1) Production; (2) Forestry; (3) Fisheries; (4) Inputs (F) (Fertilizers); (5) Inputs (M) (Machinery); (6) Land Problems; (7) Special Development Programmes; and (8) Coordination. The specialised offices are: (1) The Indian Council of Agricultural Research; (2) The

¹¹ M.F.A Office Order; Annual Report of the Ministry for 1966-67, Department of Agriculture 1966-67, p. 36.

¹² Office order No. 29-29/65 O & M, December 1, 1966. Ministry of Food and Agriculture; also the Annual Report of the Ministry of Food and Agriculture (Department of Agriculture), 1966-67.

Directorate General of State Farms; (3) Agricultural Prices Commission; (4) The Directorate of Extension; and (5) The Directorate of Economics and Statistics.

These are located within the Secretariat of the Department as also certain cells and smaller units.

The supervisory and operational agencies are outside the Secretariat and located in different parts of the country. There are either attached or subordinate offices and include the Directorates of Marketing and Inspection, Plant Protection, Quarantine and Storage, a number of commodity offices such as the Coffee and Tea Boards, institutes of research and other offices in the Forestry, Animal Husbandry and Fisheries Divisions of the Departments.

The *Production Wing* is concerned with the making of policy and programmes at the departmental level and is headed by an additional secretary. It is divided into the Crops and Animal Husbandry Divisions. The Crops Division has separate branches for dealing with food crops and cash crops and deals with all matters relating to the development of rice, wheat, pulses and millets as well as with jute, cotton, sugarcane, groundnuts and cash crops. The Animal Husbandry Division is concerned with policy and programmes in regard to livestock and dairying and is organised in three branches for dairy development, livestock production and livestock health respectively.

The *Forestry Wing* is headed by an Inspector General of Forests, who is the only scientist with *ex officio* secretariat status, and deals with national policy for forests, forestry education, etc. It has two branches dealing with development and administration respectively. The former deals with the problems of forest development and the preservation of wild life. The latter deals with the Forest Service, Forest Research Institute, Colleges, etc. The Central Forestry Commission advised this Wing on forest policy and standardising forest techniques.

The *Fisheries Wing* headed by a Joint Secretary is concerned with policies and programmes for the development of fisheries, engineering, processing and preservation. The Wing has a Planning and Development branch and a Fisheries' Education and Trade branch.

The two *Inputs Wings* (*F and M*) each headed by a Joint Secretary. The Fertiliser Wing is concerned with policies and programmes in regard to the procurement, distribution and utilisation of chemical fertilisers, organic manures, the development of improved seeds and with minor irrigation. The Machinery Wing deals with plant protection, agricultural machinery and supplies of iron and steel, cement, diesel oil, etc., for agricultural uses and water utilisation. Different sections deal with planning, procurement and the distribution of fertilisers. The Seeds Division deals with the overall organisation of production, procurement and distribution of improved seeds of all crops and is administratively responsible for the National Seeds Corporation. Plant Protection is dealt with through a Directorate of Plant Protection which is an attached office with a plant protection adviser as its head.

A Machinery and Supplies Division of this wing is to be organised to deal with matters relating to agricultural machinery and implements, the coordination of demand and the supplies of machinery needed from indigenous production or imports and of scarce materials like iron and steel, cement, jeeps, etc.

The *Lands Wing* has not yet fully organised. It is to consist of three branches dealing with Lands, Soil Conservation and Agricultural Credit. The first will deal with the acquisition of lands, land reform, utilisation of uncultivated land, wastelands, survey and reclamation, resettlement of the landless and land development. The second branch with all matters connected with soil conservation and agricultural credit. The details of administrative organisation for the third branch are yet to be determined. A land administration section of this wing will deal with soil conservation research, land use, land survey schemes and administrative matters relating to the Directorate of Agricultural Marketing, Agmark Laboratories, grading and marketing.

The *Special Development Wing* will consist of two sections, one dealing with the Agricultural Production Board, agro-industries and the other with the planning of the development of special areas like hill and desert regions, the Chambal Valley and areas of chronic drought, etc.

The *Coordination Wing* is organised in four divisions: Plan Coordination, Foreign Aid, General Administration and Personnel occupy a key position in the Ministry as a whole. The Plan Coordination Division includes an expenditure coordination unit coordinating all grants-in-aid, loans and contributions to States. It also effects budget coordination in relation to the ICAR, the Forestry Wing, the Inspectorate of Agricultural Marketing, the Delhi Milk Supply Scheme, etc. It has an economic policy section dealing with economic and statistical service, agro-economic research, the prices of essential commodities, farm management schemes and agricultural labour policy; and a plan coordination section to coordinate plan schemes, "progressing" them; to issue of payment sanctions of Central assistance to States, and coordinate budget work in respect of State schemes and Centrally sponsored schemes. The functions in relation to the coordination of the Central and State plans and their implementation have been entrusted to the State's Liaison Unit attached to this division. Since the unit was set up a senior officer in each division of the Ministry has been named "progress" officer with the duty of collecting and analysing information and submitting a monthly review of progress of schemes falling within its jurisdiction to its head. The States' Liaison Unit carries on the necessary correspondence with the States at the official level and deals with important problems affecting more than one state. To coordinate and expedite action in implementing agricultural programmes are its main responsibilities.

The Foreign Aid Division deals with all aspects of foreign aid: bilateral technical assistance, economic aid, F.A.O. and U.N. Special Fund Projects, deputations, etc.

The General Administration Division looks after the house-keeping activities of the Ministry, budget and accounts, organisation and methods, and general coordination.

The Personnel Division deals with all personnel management questions in the Ministry.

We may turn now to the specialised agencies.

The *Indian Council of Agricultural Research* was established in 1929 "to undertake aid, promote, and coordinate agricultural and animal husbandry education, research and its application

to practice", and to act as a clearing house of information in regard to research as well as to all other matters pertaining to agriculture and animal husbandry. Till 1964 it was headed by a civil servant. Under the scheme of reorganisation it has been placed under a scientist who is designated the Director-General. The ICAR is autonomous and has its own governing body on which the Centre and States are represented. In the recent reorganisation all central institutes of research in agricultural and veterinary science and higher education in these subjects have been brought under its administrative control. Functions which were not relevant to its central purpose of advancing research and education have been transferred to the Ministry. It may be noted that the establishment of autonomous Agricultural Universities in the States in some respects duplicates the work of the ICAR and may affect its ability to lay down the standards of higher agricultural education in the country. Research is basic to increasing agricultural productivity and the ICAR's role, therefore, is of crucial importance.

The *Agricultural Prices Commission* was set up in 1965. It is an expert autonomous body to advise the government on its price policy for all major agricultural commodities including cereals, pulses, oilseeds and fibres and assist the government in evolving "a balanced and integrated price structure in the perspective of the overall needs of the economy and with due regard to the interests of the producers and consumers".¹³

The setting up of the Commission is a great step forward and is the result of the realisation on the part of the government of the imperative need for assuring to the primary producer remunerative minimum prices for his produce and of systematically and effectively using the market mechanism to stimulate agricultural production.

The *Directorate of Extension* is, in the Indian context, of tremendous importance. Any agricultural programme for its successful implementation needs to be accepted by vast numbers of the sixty millions of farmers in the country who are largely illiterate. The message of higher agricultural production,

¹³ Annual Report for 1966-67, Ministry of Food and Agriculture, Department of Agriculture, p. 35.

scientific technology and the results of research has to be transmitted to the individual farmers. An adequate extension organisation is, therefore, a *must* for a break-through in agriculture. The Directorate of Extension which is headed by an Extension Commissioner, an agricultural scientist, has been given the function of operating and supervising the implementation of crash programmes of agricultural production in the States, e.g., the Intensive Agricultural Development Programme and the High Yielding Varieties' Programme. The Directorate has to attend to the supply of needed inputs and the training of extension workers, until a separate training directorate is set up.

The Extension Directorate has within it a *Farm Advisory Unit* consisting of ten subject matter specialists who serve as a liaison between agricultural research institutions on the one hand and extension agencies on the other. It has also a *Farm Information Unit* which produces the literature, audio-visual and other aids needed for extension work. An *Implements Unit* serves the Directorate for popularising improved implements and a *Package Programme Unit* attends to extension in the IADP districts. A *Training Unit* attends to extension training and education of workers and farmers.

It has been decided to set up four regional units of the Directorate for assisting and advising and supervising the execution of the new agricultural programmes in the States and to direct extension work. One regional office has begun functioning.

Extension work is essentially local and must be handled in the main by the State departments. But the stimulus and the greater knowledge that an extension agency at the Centre can bring to the task are indispensable in activating the states.

The *Directorate of Economics and Statistics* was set up in 1948 and its main task is to provide the Ministry with economic intelligence and basic data needed for policy making. Since 1957 when the first plan was launched the work of the Directorate has greatly increased as also its staff. It is at present headed by the Economic and Statistical Adviser to the Ministry and has a staff of over sixty officers and 600 others. The Directorate collects, analyses and publishes agro-economic data, provides

the Ministry with briefs on current issues, helps to coordinate five year and annual plans, carries out a continuous assessment of the progress of plan schemes, keeps a watch over agricultural price trends and undertakes research in farm management and other agro-economic questions. The *Directorate General of State Farms* headed by a Director-General manages the two State farms in the country at Suratgarh and Jetsar. These large sized and wholly mechanised farms have no more than a demonstration value in the context of the small holdings of most Indian cultivators and legislation fixing ceilings.

Lastly, reference may be made to the numerous subordinate and attached offices of the Department which operate various programmes of the Ministry, expert committees and other agencies. The more important attached offices are the Directorate of Plant Protection, the office of the Agricultural Marketing Adviser, the National Seeds Corporation, the Warehousing Corporation, etc.

Committees, both official and unofficial, expert or representative of interests have been established to advise the Ministry on many important matters. Fifteen of these have been listed as functioning at present. The Panels of Economists, Panel of Experts on Agricultural Administration, Panel of Agricultural Scientists, and the Panel on Nationwide Agricultural Demonstration and finally Panel of Farmers to advise the Agricultural Prices Commission.

The other agencies falling in this category are:

Committee for the Improvement of Agricultural Statistics.

National Committee on the Preparation of Farm Management Manual for the use of extension workers.

Study Group on Wild Life and Wild Life Products.

Indian Board for Wild Life.

Central Forestry Commission.

Board for Agricultural Machinery and Implements.

Standing Committee of Experts on Manures and Fertilisers.

National F.A.O. Liaison Committee.

Central Council of Gosamvardhana to attend to a variety of important functions in regard to the improvement of animal husbandry and dairying in the country, Central Variety Release

Committee—for selection and release of new varieties of improved seeds, Central Board of Fisheries, Central Fisheries Research Committee.

The areas covered by these boards and committees are of vital importance to the development of agriculture and it is necessary, therefore, that they should be active bodies manned by competent personnel.

The Planning Commission's role in agricultural administration needs to be examined. It is directly and intimately connected with agricultural development at all stages from policy formulation and planning to plan implementation and evaluation. The Planning Commission's concurrence is required for the Ministry's policies and programmes in detail. In fixing the targets of production, in making financial allocations in the five year plan and in the annual plans, in negotiations with the States, the Planning Commission plays a leading if not dominant role. The working relations between the Planning Commission and the Ministry have not been always smooth and are not infrequently marked by friction.

Agriculture is the charge of a member of the Commission since 1960, and a division of the Planning deals with the subject. The division is headed by a Joint Secretary who is also responsible for coordinating the work of community development, agriculture and irrigation divisions of the Planning Commission collectively known as the agricultural divisions. It has a division of land reforms whose head is the Joint Secretary in charge of land reforms in the Ministry.

The expert staff of the agriculture division consists of programme advisers, one chief (who is a retired director of agriculture), two assistant chiefs, and half a dozen research officers at lower levels. From the point of view of technical expertise in the field of agriculture the Commission is poorly equipped for its functions.

We have now completed our survey of the machinery of agricultural administration at the Centre. Some of the highlights need to be restated. The Ministry of Agriculture historically has been the outgrowth of the problem of recurrent famines and of food shortages since the mid-nineteenth century. The

problem is too vast for any provincial (now state) administration to solve by its own unaided efforts and resources. Whether the system of government in India is unitary as it was before 1935 or federal as it has been since, the Centre must concern itself with the problem of food shortage and of agricultural development, for without such involvement the problems cannot be solved. Many of the problems of agriculture though primarily local, cannot be locally solved. For this reason, agricultural development as indeed development in other spheres must be the joint concern of the Centre and the States.

It is interesting to note that chronologically the first agricultural activities to be assumed by the Centre were the collection of statistical data relating to land to enable a better administration of revenue and famine relief. Next come research and education in agriculture and last of all developmental and extension activities. In such a context it is only natural that the general administrator should dominate over the scientist and specialist. But if Indian agriculture is to be modernised and cease to be the subsistence agriculture that it has been in the past the scientist must be given greater responsibility in the administration of agricultural programmes, in their planning and execution. A key role has to be assigned to the agricultural scientist as well as to other technical personnel.

The Department of Agriculture has expanded greatly, especially since the food crisis of 1942-3 and more so since the country adopted national economic planning in 1951. It may be mentioned that the expansion of the provincial departments of agriculture has taken place in the same period and for similar reasons. The expansion of the Central department has not been at the expense of the state departments. This fact tends to be forgotten by the critics of the growth of the Central Ministry in the name of state autonomy. It is worth noting here that the greatest progress has been achieved in agricultural development only when the Centre has taken the initiative, stimulated and co-ordinated the activities of the agricultural departments of the States. This emphasises the need for regarding agriculture as a field of joint endeavour between the Centre and the States.

The reorganisation of the Ministry effected recently can only be regarded as the first step in a process of reform to equip the Central Ministry to fulfil better its great and growing responsibilities. The reform has been carried out piecemeal and is in some respects incomplete. It is doubtful, for instance, if effective and appropriate machinery has been created under the reorganised set-up to ensure coordination. At the very apex inter-ministerial coordination has to be effected. This is at present done by the *Agricultural Production Board*, and through conferences and meetings of secretaries and other officials. The Board has yet to establish itself as an effective instrument for the coordination of policy. In this context the suggestion that inter-related ministries should be grouped together and placed under the control of a senior minister, as recommended by the Gopalaswami Ayyangar Report, needs to be considered seriously. Alternately the Agricultural Production Board should be made more effective than it has been since its creation.

There is no doubt that a degree of rationalisation has been effected in the division of responsibilities between different wings of the Ministry. But this has followed no scientific principles, such as is possible through systems analysis and is largely *ad hoc* and empirical. It is necessary to examine the functions of the different divisions, wings, branches, of the Ministry, its subdivisions and sections, and of attached and subordinate offices, etc., to determine rationally the suitability of their organisation for the performance of functions entrusted to them. Reorganisation must be based on more detailed analysis and study of the functions and institutional arrangements than has been yet attempted.

It was one of the aims of the reorganisation of the Ministry that scientists and technical personnel should be entrusted with executive and operational responsibilities and given a secretariat status. The aim has not been fulfilled. Few scientists have been given secretariat status or executive functions.

It was also one of the objects of the reorganisation to equip the Minister and the Secretary with expert advisers both from within the Ministry and from outside so that they would be well advised in making policy decisions and in planning development. This object has not been realised.

A planning cell at the highest level to formulate plans both for the short period and against a longer perspective for the Ministry has also not been provided. The task of planning has been left largely to subordinate levels of the administrative hierarchy and the technical officers of the Ministry and is dispersed over the different sections and divisions of the Ministry.

Reform is necessary not only in the structure, but also in procedures. The levels of decision-making, delegation, accountability, the procedures for the scrutiny of schemes and the issue of financial sanctions, references to finance, etc. In this area there is need to introduce modern business techniques and procedures to render administrative action more speedy and efficient.

It is yet too early to assess the results of the reorganisation of the secretariat of the department. Any judgment on it would require a more detailed and thorough analysis of the changes than has been possible. The picture of the new set-up is not altogether clear. Whether the reorganisation will lead to the more efficient functioning of the administrative machine and enable the Department to plan and execute development programmes with greater speed and efficiency remains to be seen.

THE GROWTH OF THE STATE DEPARTMENTS OF AGRICULTURE

N. SRINIVASAN
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The administrative machinery for agricultural development in the States includes the whole complex of departments and service organisations related to rural welfare, each with its own hierarchy from the Secretariat down to the tehsil or block and the village level. This paper does not attempt survey of the entire machinery but deals with the limited subject of the growth of the departments of agriculture in the States directly concerned with agricultural development. Against a background of history it attempts an analysis of the problems arising from the existing administrative structure and procedures for promoting agricultural development in the States. Some of the generalisations made here may not be equally applicable to all States as conditions differ from one state to another and some of the problems referred to will need further investigation before definite measures could be suggested for their solution.

Provincial agricultural departments came into being mostly in the years between 1875 and 1905.¹ They were established mostly following the report of the Famine Enquiry Commission of 1880 which had strongly urged the setting up of permanent departments of agriculture in the Provinces. Their growth was parallel with that of the Central Department of Agriculture which had been set up in 1871. Under the highly centralised and unitary system of the Government of India prior to 1919, the initiative in developing the departmental organisation in the Provinces and their direction and ultimate control lay with the Centre. The provinces began to acquire the initiative only after the devolution of powers and the relaxation of central control over the

¹ The first Provincial Agricultural Department to be set up was that of the U.P., then known as North Western Province in 1875.

Provinces under the constitutional reforms of 1919. Under dyarchy (1921-37) agriculture was a transferred subject under the control of responsible ministers. Under the system of Provincial autonomy under the Government of India Act of 1935 the Provinces acquired greater control and became wholly responsible for agriculture. In the new Constitution (1950), the greater part of the responsibility for agricultural development lies with the governments of the States as under the Act of 1935.

At their establishment and for a long time afterwards the main work of the agricultural departments in the provinces was to collect statistical information about land and its utilisation. The Resolution of the Government of India of December 8, 1881, defined the functions of the Provincial Agriculture Department as agricultural enquiry, improvement and famine relief. In practice, statistical enquiries and management of famine relief became the primary concerns of the Department. The subject of agriculture was combined with land records and settlement work. The expert staff of the departments consisted of a Director and an Assistant or Deputy Director. The expansion of the Department until 1905 was conditioned by the Government of India's directive that "Investigation must precede improvement". Provincial enthusiasm and experiments in agricultural improvement were largely infructuous. Lord Curzon's viceroyalty (1898-1905) marks the beginning of a new era of growth for agricultural departments both at the Centre and in the Provinces and the Despatch of the Government of India of the June 4, 1903, provided its key note. In 1905, the Government of India decided to set apart annually a sum of Rs. 20 lakhs to assist the development of agricultural research, demonstration and education in the provinces. Legislation was adopted to deal with rural indebtedness. Full time Directors of Agriculture were appointed in all the major provinces. The provinces were divided into a suitable number of "Circles" and each was to have an experimental farm on the basis of regional differences of soil and climate under a Deputy Director of Agriculture. These farms were to function also as depots for seeds, manures and implements.²

² The farms came into existence initially as a result of the British interest in commercial crops and were meant to study the behaviour of selected

Till 1921, when agriculture became a "transferred" subject the expansion of Provincial Agriculture Departments was entirely dependent upon the Central Government which allocated funds for the development of agricultural research, education and demonstration. Though the number of subject matter specialists substantially increased, the all round expansion of the departments was restricted by the meagre provincial finances available for agriculture and was halted by the War between 1914-18. The direct responsibility of the Centre for the administration of "agriculture", "the civil veterinary department" and "cooperative societies" ceased in 1921. The provinces tended to become less dependent upon assistance and advice from the Imperial Department of Agriculture. Land records work had by now been separated and entrusted to Revenue Departments.³ The main pre-occupation of the Agriculture Departments, however, still continued to be investigation rather than agricultural development through extension and advisory services to farmers.⁴

In the twenties there was a further increase in the number of subject matter specialists. The debates in the Legislative Councils after the transfer of agriculture to the provinces and the keener public interest in the affairs of the department stimulated the activities of the departments. These were within the basic framework of Curzon's reforms and were concerned with agricultural research, demonstration and education.⁵ The provincial links with the Imperial Department of Agriculture were

varieties of seeds for seed multiplication and also for training the higher officers brought from U.K. Subsequently, with the broadening of agricultural policy, these farms took up wider schemes of laboratory and experimental work and field trials. See Report of the Agricultural Farm Enquiry Committee, Government of Bihar, 1955, p. 93.

³ In the U.P. the separation took place in 1920, Punjab 1906, Assam 1907 and Bombay 1904.

⁴ See Chill Report on Agriculture in United Provinces, submitted to the Royal Commission on Indian Agriculture, 1926-28.

⁵ The break up of the total outlay of Rs. 24.46 lakhs during 1926-27 by the U.P. Agriculture Department was as follows:

(i) General	Rs. 5.4 lakhs	
(ii) Circles	Rs. 6.1 lakhs	
(iii) Cattle Breeding	Rs. 2.1 lakhs	Vide Royal Commission on
(iv) Agriculture Engineering	Rs. 3.4 lakhs	Agriculture in India, Intro-
(v) Education & Research	Rs. 3.9 lakhs	duction to Vol. VII, Evidence
(vi) Gardens	Rs. 2.0 lakhs	taken in United Provinces,
(vii) Works	Rs. 1.6 lakhs	1928, p. 31.

considerably weakened with the stoppage of recruitment to All India services like the Imperial Agriculture, Forest and Veterinary Services on the recommendation of the Lee Commission in 1924.

The growth of other departments related to agriculture may also be briefly noted here. The Forest Departments were organised in many cases earlier than the Agriculture Departments. Though the principle of forests as the "handmaid of agriculture" was asserted,⁶ in practice the growth of the two departments took place in isolation from each other, the former having a bias towards the commercial success of the activities undertaken by it. Irrigation continued to be looked after for a long time by the Public Works Department. The Irrigation Commission 1901-03 had observed that neither the Department of Agriculture nor the Public Works Department had paid sufficient attention to irrigation and had stressed the need for separate departments to attend to it. Separate irrigation departments, however, were formed generally much later and after the Reforms of 1919. The formation of the Cooperative Department followed the passing of the first Cooperative Societies Act, 1904. The pattern of the growth of these departments was the same as in the case of the Agriculture Department, *i.e.*, installation of subject matter specialists at the headquarters, with limited support at lower levels at first and their later expansion.

The development of departments of agriculture in the thirties generally followed the recommendations of the Royal Commission on Agriculture, 1928. The provincial governments were eager to implement the recommendations of the Royal Commission but were handicapped by the lack of financial resources. Grants from the Indian Council of Agricultural Research which was set up in 1929, and the Commodity Committees set up at different times between 1921 and 1940 enabled the provincial departments to undertake a number of individual schemes, on a temporary basis. Provincial marketing officers were added to the Agriculture Departments following the appointment of a Marketing Adviser at the Centre in 1935. Irrigation and Forests which

⁶ Government of India Circular Letter No. 22-F, dated October 19, 1894 and U.P. Government's Resolution No. 348, dated August 26, 1912.

had been reserved subjects under the reforms of 1919 came under provincial control under the Government of India Act, 1935. The impact of the formation of popular governments in 1937 on the growth of agricultural organisation was slight because of the shortness of their term of office and preoccupation with legislative measures relating to the reform of tenancy, land revenue, debt reduction and the regulation of money lending and interest rates.

The expenditure on Agriculture in the major provinces shown in the table below is indicative of the growth of the departments of agriculture during the years 1921-47.⁷

Name of Provinces	Base year	Expenditure in Lakhs			
		1920-21	1926-27	1936-37	1946-47
Bombay	4.5 (1907-08)	16.2	16.5	22.4	247
U.P.	7.14 (1913-14)	16	23.4	36.7	94
Punjab	2.58 (1906-07)	18	23	28.5	26.57 ^{as}
Madras	7.73 (1916-17)	12.7	16.7	41.7	73 ⁹

The activities of agricultural departments during this period were largely confined to research in narrow field and demonstrations. They did not undertake the "servicing" of agricultural development by providing the inputs and credit requirements of farmers. Sir John Russel observed in his Report that "in India the stage has been reached when the machinery for gaining more knowledge is working better than the machinery for utilising it".¹⁰ Development was somewhat lopsided. There was notable advance in the field of research. But there was hardly any extension with the result that the results of research remained unused. In 1936-37, the staff of the Agricultural Departments of the major provinces like Bombay, Madras, Punjab, U.P. and Bengal, on

⁷ Source: (i) Royal Commission on Agriculture: Introduction to the Evidence in respect of the concerned provinces.

(ii) Royal Commission on Agriculture, 1928, pp. 36-37.

(iii) Report on the work of the I.C.A.R. in applying science to crop production in India by Sir John Russell, I.C.A.R., 1937, Table 16.

(iv) Annual Reports of the Department of Agriculture of the provinces.

⁸ Pertains to 1947-48, i.e., after Partition. The figure rose to 111.25 lakhs in 1949-50.

⁹ Pertains to 1945-46.

¹⁰ Report, *cp. cit.*, p. 70.

an average consisted of 25 to 40 gazetted officers. Bihar and Orissa had only 18 and 14 while Madras and Punjab possessed 59 and 60 officers respectively.¹¹ Only an insignificant number of these were engaged in actual extension and development activities. District administration was essentially revenue-oriented and was little concerned with agricultural extension work.

The turning point in the growth of agriculture departments came with the food crisis created by the Second World War and the Bengal Famine, 1943. The Grow More Food Campaign initiated in 1943 in order to meet the acute food scarcity placed new responsibilities on the Central as well as on the provincial governments. The agricultural machinery in the provinces was put to its first real test and it proved unequal to its new tasks. The administrative arrangements and field establishments of the departments could not handle the development schemes under the G.M.F. The general district administration was pre-occupied with other matters and regarded agricultural activities as of secondary importance.¹² There was no attempt to create an extension organisation in the departments of agriculture that could have effectively carried out the G.M.F. programme. The development of a district and field organisation was gradual and piecemeal. The creation of the post of District Agricultural Officer or District Food Officer as he was first designated in some cases, came generally in the wake of Grow More Food campaign, and was the first step towards filling this gap. The new stress upon servicing functions led to some rudimentary efforts to organise the activities of agriculture departments on a functional basis. The departments focussed their attention on the Grow

¹¹ Report on the work of the I.C.A.R. by John Russel, 1937, Table 41, p. 180. By 1949-50, Madras had a total of 197 gazetted officers, Administration Report of the Agricultural Department for 1949-50, Government of Madras, p. 89.

¹² Initially even the schemes under the Grow More Food Campaign were executed through the Deputy Directors in charge of Circles. The change over to the institution of District Agricultural Office took place in U.P. in 1949, in Bombay during 1947-48 but much later in the case of West Bengal. On the other hand in Madras, as early as 1938 the number of Deputy Directors in charge of Circles was reduced from 8 to 4 and the number of Assistant Directors of Agriculture below the Deputy Directors who functioned at the District level was increased. The State Headquarters in U.P. was an isolated case. In other States they continued at the Range level, Annual Reports of the respective provincial Agriculture Departments.

More Food campaign. There was a rapid increase in the outlay of the departments on programmes of development since 1943 due to large grants from the Government of India first for the Grow More Food schemes and later for reconstruction programmes. The number of subject matter specialists required in connection with these campaigns increased and the district staff was also strengthened to cope with the new responsibilities. Most of the staff was, however, appointed on a temporary basis, mainly because the Grow More Good schemes were themselves of an *ad hoc* nature. This introduced an element of uncertainty and prevented any effort at a complete reorganisation of agriculture department.¹³

Despite these notable changes, Bombay, U.P., East Punjab and Madras spent during 1947-48, only 7, 3.6, 2.2 and 4 per cent respectively of their total budget on agriculture. The Departments of Agriculture were still in comparison with the Political or Revenue Departments unimportant and neglected. The picture changed rapidly only with the introduction of National Extension Service in 1952. The expenditure of the States on agriculture, community development and irrigation and flood control rose from 38.61 per cent of total outlay under the First Plan to 40.53 and 48.38 per cent during the Second and Third Plans respectively.

The expansion of the departments of agriculture during the plan period exhibits three basic features. Firstly, new departments, ancillary to agriculture were added such as Animal Husbandry, Community Development, Fisheries, Minor Irrigation, etc. It may be noted here that the allocation of these subjects between different departments varied from one State to another. Secondly, the Community Development programmes introduced a basic framework for agricultural extension organisation at the block and the village levels with a provision for the appointment of subject matter specialists to work in the field. This led to a strengthening of the organisation at the field level in Agriculture, Animal Husbandry, Fisheries and allied departments. These departments acquired a field

¹³ See Report of the Agriculture Policy Committee, Madhya Pradesh, 1951, Government of Madhya Pradesh, Nagpur, 1952, para 460.

organisation. The First Plan period as well as the beginning years of the Second Plan were spent largely in building up the essential administrative apparatus of the agriculture and allied departments. Under the Community Development set-up while the subordinate staff up to the level of agricultural assistant (Agricultural Extension Officer) is to work under the B.D.O. under the overall control of the District Collector, the technical officers at the Block level and above are under the control of the technical departments. This has introduced the problem of dual control over the extension staff. The officers of the Department of Agriculture are only indirectly and partially responsible for agricultural extension. In the situation, developmental research and demonstration for which the Deputy Directors were directly responsible receded to the background in comparison with general extension service under the Block administration. At the State level, the Development Commissioner and the Community Development Department, were assisted by the State Development Committee, the principal agencies for effecting coordination among various departments concerned with rural development. The role of the Department of Agriculture in coordination among the various departments concerned with agriculture was secondary. An assumption underlying these arrangements was that under the leadership of the Development Commissioner, each technical department would be able to play its proper role in organising and operating the National Extension Service.¹⁴ The chain formed by the Development Commissioner, the District Collector and the B.D.O., however, worked independently of the agricultural hierarchy.

Thirdly, within the departments of agriculture new whole time officers were added at the headquarters at the level of joint directors or as junior officers to look after new specialised areas such as plant protection, soil conservation, the Intensive Agricultural District Programme, agricultural engineering, planning, etc. The expansion was accommodated within the accepted broad divisions of research, education and extension. Significantly, the growth of the departments took place as a result of a

¹⁴ Letter No. CPA/163/52 dated the April 29, 1953 from the Community Project Administration to the States.

series of central recommendations made from time to time during the plan period and invariably supported by central subsidies.

The historical survey of the growth of the state departments of agriculture which has been presented above is the background for a study of their working at present. Though what follows is based largely on a study of the conditions in Bihar, account has been taken of the experience of other states and it is believed that the observations and recommendations on agricultural administration made in the paper will be generally applicable to most if not all the States. The problems of agricultural administration are examined under four heads as follows:

- (i) the overall structure;
- (ii) inter-departmental coordination;
- (iii) internal organisation and management; and
- (iv) functional integration.

THE OVERALL STRUCTURE

We have seen that the expansion of the agriculture departments in the States was not according to any comprehensive design with the result that the structure built up is incomplete. The administrative organisation for implementing programmes like soil conservation, plant protection, extension and training began to receive sufficient attention rather late even during the plan period and has remained weak, especially at the district and block levels.¹⁵ Similarly also warehousing and storage and sections dealing with implements, agricultural engineering still remain weak. The agricultural machinery division has been neglected in most stages, including the Punjab.¹⁶ These organisational gaps were in part responsible for shortfalls in the

¹⁵ Prescribed staffs have not been appointed. In the States where soil conservation legislation has been enacted it has been brought into operations only partially. Where soil conservation boards have been set up their functions vary widely. The agricultural engineering section till recently has been the most neglected area.

¹⁶ Study on soil conservation for agricultural land, P.E.O. Chapter II and Mid-term Appraisal of the Third Plan, 1962, p. 74. The COPP Report on Improved Agricultural Implements (Punjab), 1963, Chapter II, para 22, regarded it as "in a dislocated, disorganised condition".

fulfilment of sectoral targets under the three plans. To cite one instance in Maharashtra and Gujarat which have a comparatively well staffed competent soil conservation organisation, the progress achieved has been notable while in States where the organisation is weak soil conservation programmes have lagged behind.

Secondly, as additional responsibilities have been met by placing officers at State headquarters with inadequate supporting staff at the field level, a top heavy administrative structure has resulted.¹⁷ The practice has been to sanction Class I posts as Joint or Deputy Directors with State-wide jurisdiction on the plea of strengthening the management of specific production programmes. In some cases officers may be supervising divisional deputy directors, thus introducing a new link between the division and the Headquarters restricting the operational freedom of the divisional heads and leading to the establishment of different secretariats at Headquarters Offices.¹⁸ The more experienced and qualified officers tended to get concentrated at the Headquarters and the regional level. The result was as the Estimates Committee of the Bihar Legislature observed "that only those who have got very little training and experience in the field of agriculture are put in charge of the field work to help the cultivators in the villages."¹⁹

During the Grow More Food campaigns the departments of agriculture took upon themselves a number of supply and trading functions. Even now the departments directly control the distribution of seeds, pesticides, implements and takavi

¹⁷ Under the Extension Division of the State Department of Agriculture, Bihar, as in 1960, out of 132 gazetted officers, 57, mostly senior officers were placed at the State and Range level while 75 were at the District and Sub-Divisional level, *vide* Bihar Vidhan Sabha, Committee on Estimates, Second Assembly, Third Report on the Department of Agriculture, Patna, 1960, p. 48.

¹⁸ "If the intention is to have a man of status, the post of Joint Director can as well move to the Divisions and number of posts retrenched." Para 22, Seventh Report of the Estimates Committee on Agriculture, Horticulture, Animal Husbandry, Fisheries and Coordination Departments, March 1965.

¹⁹ Committee on Estimates, Bihar, *op. cit.*, p. 23.

loans in a number of States.²⁰ This affects the extension functions of the field level staff. They are burdened with the distribution, accounting and care of the stocks and have little time for extension work. Departmental control over semi-commercial operations does not make for the flexibility needed in operations of this kind. The miscellaneous bundle of duties of the department affects the quality of its technical services.

INTER-DEPARTMENTAL COORDINATION²¹

The existence of a large number of departments dealing with agriculture is itself the most important single factor leading to a diffusion of responsibilities. Apart from the Department of Agriculture, there are separate departments for animal husbandry, forests, irrigation, minor irrigation, community development, cooperation, food, fisheries, etc.²² In addition, the Departments of Revenue, and Panchayat and Boards of Electricity are also concerned with certain aspects of agricultural development. As a result, the same subject may be dealt with by a number of agencies. Four to five departments are concerned with minor irrigation, namely, Agriculture, Community Development, Revenue, Irrigation, Cooperation, Panchayats and P.W.D. The implementation of soil conservation programme is divided between Agriculture, Forest and Revenue Departments. Warehousing and marketing are divided between community development and agriculture and agricultural statistics between Finance, Agriculture and Planning. There is a division of responsibilities in dealing with land reforms, land reclamation, agricultural credit, etc. The Central Teams which went round the States in 1963 observed: "The gaps and deficiencies arising from diffused and divided responsibility and lack of definition of relationship between different agencies and organisations dealing with interrelated and inter-dependent aspects of the same programme called for immediate attention".

²⁰ As in the case of Andhra Pradesh, Assam, Bihar, Madhya Pradesh, West Bengal, Madras, etc. See Annual Report of the Central Department of Cooperation, 1965-66 and the Proceedings of Community Development Conference, 1963.

²¹ See Donald C. Pelz, *Coordination in Administration of Agricultural Development—A survey conducted under the auspices of the IIPA, 1964-66*. University of Michigan, Ann Arbor, 1967.

²² These, of course, differ in different States.

The problems at the field level are made difficult since the extension officers feel more loyal to the separate technical departments to whose cadres they belong than to the development block where they work. The Department of Community Development which was intended to be the coordinating link between different development departments in the field has failed in this task and has come to be treated simply as one more addition to the several existing departments for rural development. The extension service organisation whose personnel was drawn from agriculture and other departments, functioned under the Department of Community Development. The parent department which supplied the personnel had no direct control over the extension set-up and tended to function more in an advisory capacity in relation to the Development Commissioner or the B.D.O. There was also a lack of coordination between the agricultural programmes included in the schematic budget of the Community Development Programme and the different departments functioning in the field of rural development though they were entrusted with the technical supervision of community development work. In a particular case it has been observed that within certain financial powers that were delegated to the B.D.O. sanctions could be issued by him as well as by the Department of Agriculture.²³ There have been criticisms of the quantum and pattern of assistance being different for identical programmes included in the schematic budget and for those outside the budget.²⁴

There are other cases of divided responsibility. The Forest Department while selecting lands for afforestation may overlook or ignore the soil conservation aspects of agricultural lands. The Department of Agriculture on the other hand may not pay the same attention to afforestation in the upper catchment areas or other measures of soil conservation. To take another area there is a lack of correspondence between the takavi advanced through the Government and cooperative credit in regard to the rate of

²³ Source: Department of Agriculture, Bihar.

²⁴ See Report of the Study Group on Budgetary and Accounting Procedure of Panchayats, Department of Community Development, Government of India, 1963, pp. 27-28.

interest charged and the agency of distribution. The rate of interest on the former has been lower.

Lack of coordination is indeed the central problem of state agricultural administration. Till recently there was no coordinating machinery for rural development work by different departments of the State. The coordinating agency introduced by the Community Development Programme consisted of a Committee at Minister's level under the chairmanship of the Chief Minister assisted at the executive level by a Committee of Secretaries with the Chief Secretary or Development Commissioner as the Chairman and an advisory body consisting of officials and non-officials or exclusively of non-officials. Much of the co-ordination, to the degree that it was achieved, was effected in actual practice through the Development Commissioner. The Development Commissioner did provide a unifying link for the entire developmental set-up and was instrumental to some extent in mitigating the narrow departmental outlook characteristic of separate departments and in picking up the more important problems in keeping with the priorities of the Plan. In the case of Bihar, the Development Commissioner also acts as the principal secretary of all the development departments and could take decisions on his own in respect of any one of these departments. Nevertheless, the system is subject to serious limitations. Apart from the variable of the personal stature and qualities of the officer holding the office, the presence of about half a dozen independent Ministers-in-Charge with Secretaries of the individual departments directly responsible to them makes the control of the Development Commissioner uncertain. In fact, with a rather small supporting staff under him and a heavy charge the Development Commissioner was not able to deal with manifold questions demanding day-to-day coordination between several departments. The position is not substantially different in other States. Though Development Commissioners rank high in the hierarchy of secretaries, their effectiveness depends more on their knowledge and tact than on their authority.

Within the group of departments concerned with rural development special boards or committees such as the Soil Conservation Board, Development Committees for major and

medium irrigation works, Unified Minor Irrigation Agency, coordinating bodies for the Intensive Agricultural District Programme are entrusted with the task of securing complementary services in respect of particular programmes. These bodies include the representatives of the related departments in order to facilitate coordinated action. In some cases, similar coordinating bodies are to be found also at the district level. A supplementary and sometimes parallel coordinating link could be provided through the institution of single officer agencies as in the case of state level Project Officer for the Intensive Agricultural District Programme or the separate Joint Directors at the State level expected to secure coordination in regard to the specific programmes under them. The arrangements though useful in so far as they go suffer from the basic limitation that they are projections of partial views in respect of individual programmes. The number of coordinators and the agencies to be coordinated remain the same and the total of rural development effort by several individual departments is not covered by such agencies. The real need is for an integrated structure for agricultural and rural development and this has not been effectively met.

The relationship of the Agriculture Department with the Departments of Finance and Planning needs to be redefined. The procedure of referring all proposals to the Finance Department for pre and post-budget scrutinies has continued unchanged since pre-Independence days. In the case of plan schemes their clearance by the Planning Department is also required. Starting from the time when guide-lines are indicated by the Planning Commission (September of the previous year), the Annual Plan allocations proceed by a number of stages. Proposals of the different administrative departments have to be routed through the Planning and Finance Departments to the Centre. After the approval of the Planning Commission, individual proposals have to be referred back to Finance before actual sanction which is sometimes preceded by a further reference to the Planning Department. The system persists in the States despite the fact that the same set of officers deals with the Plan and the Budget. It is suggested that once a scheme is included in the Plan after proper scrutiny, further reference to the Planning and Finance

Departments which are in the nature of a pre-audit examination is unnecessary and wasteful of time. The Finance Department which has the power of sanctioning is hardly in a position to visualise the nature of agricultural operations and their technical requirements. Adherence to financial procedures and instructions that were established under different circumstances before Independence do not fit in with the urgency in agricultural programmes and their time schedules. The conservative and the negative approach of Finance result in its attaching greater importance to a marginal cut in allocations unmindful of the damage that may be caused by delayed or untimely action. Besides the emphasis of Finance upon financial returns on investments fails to take into account the larger economic benefits that may accrue and that cannot be quantitatively assessed. The elements of risk and uncertainty in agriculture programmes cannot be judged on the basis of traditional and narrow financial yardsticks.

Under existing procedures considerable delay is caused in the sanction of scheme, appointment of staff, especially at the District and the block levels. The actual starting of the schemes is delayed in this process, often by a year or more. The quality of the scrutiny of proposals within the administrative department is diluted and its responsibilities in regard to programme planning with the necessary care and meticulousness remain unfulfilled. The Planning Unit within the Department of Agriculture, placed sometimes under a Joint or Deputy Director (Planning) functions more as a channel through which proposals are collected from different divisions within the Department and forwarded to the Department of Planning or through which approved targets are broken down and passed on to the District and the Block levels. If the overall State Plan is to be more than a paper plan it must be broken up into detailed operational plans complete in respect of all essentials such as inputs, credit requirements, technical services, staff and other complementary needs. This makes it necessary that every State Department of Agriculture should have within it a well organised and competently staffed planning cell for detailed programme planning covering the entire agricultural sector. With regard to the evaluation of agricultural

programmes, till 1964, except in the case of Rajasthan, Orissa and U.P., no State possessed any field staff for evaluation work. These States have an elaborate organisations for evaluation. Out of 80 studies undertaken by State Evaluation Units, only 24 relate specifically to agriculture, 7 to community development programmes, 6 to panchayati raj, 6 to industries, 5 to social welfare, 7 to education, 25 to other areas. Studies of administrative aspects are conspicuous by their absence. Departments of Agriculture need well-organised and staffed evaluation units for internal evaluation while independent evaluation might be entrusted to autonomous agencies like universities.²⁵

INTERNAL ORGANISATION AND MANAGEMENT

Apart from the inter-departmental relationships, the relationship between junior and senior in the department, between the various levels of hierarchy from the State Headquarters to the field and the manner in which powers are exercised and decisions are made at each level vitally affects the implementation of programmes.

The present relationship between the Director of Agriculture and the Secretary of the Department of Agriculture under which proposals are examined first in the directorate and then at the secretariat has been a source of long delay and of a dilution of responsibilities. It is rarely that the second examination at the secretariat level has anything new to add to the examination already carried out by the directorate. On the other hand, due to concentration of powers in the Secretariat, the Directors of Agriculture have to approach Government for sanction even in respect of unimportant matters.²⁶ Centralisation of powers at the Headquarters also increases the load of desk-work. The Director of Agriculture is not free from the routine administrative duties connected with appointments, transfers, promotion, disciplinary action, approval of tours, etc. This seriously limits the quality of technical supervision exercised by top experts at the State headquarters. Delegation to the lower levels is limited

²⁵ Report of the Working Group on Evaluation in the States. Planning Commission, 1964, paras 51 and 57. (pp. 23-28).

²⁶ See Report of the Administrative Reforms Committee, Andhra Pradesh Government, 1960, pp. 9-11. Also Report of the ARC, Government of Kerala, Vol. 1, 1958, pp. 77 and 86.

to relatively minor matters. A number of intermediary stages between the sanctioning authority at the state level and the spending agency at the Block level make it difficult to assure timely action either of supplies, credit or of development work.²⁷ In a case cited by the P.E.O., "the procedure involved in selecting a site for a farm with the minimum of staff took one year and eight months of which 12 months could have been avoided if approval of the site by the State Government after the Director of Agriculture had approved of it had not been insisted on and if the Collector's land acquisition notification had been published in the gazette without the need to refer it to the Government, and if the Farm Assistant had been posted in good time".²⁸ Even in the IADP areas, the working of seed farms, information units, implement workshops and soil testing laboratories was handicapped due to lack of adequate delegation of powers to the executors of programmes for the purchase of equipment, materials, etc., which were locally available.²⁹ The recent evaluation of the high yielding varieties' programme again points out that the untimely supplies and inadequacy of institutional arrangements for distribution of inputs are the factors responsible for lags in implementation of the programme and underlines the need for meeting the functional requirements of different jobs and decisions on a coordinated basis.³⁰ Senior officers are preoccupied with a great deal of desk work to be able to spend much time in the field and lose touch with actualities and with operating personnel. It may be said that the spread of science and technology for increasing agricultural productivity has been handicapped by existing administrative organisation and procedures more than by the traditional attitudes and lack of receptivity of farmers.

At the State headquarters the responsibilities of the department for general administration, development, extension, research

²⁷ Complaints about delays in the execution of agricultural programmes due to administrative complexities and over-centralisation of powers made at the Conference of State Ministers of Agriculture, at Srinagar in 1967, led to the setting up of the Nalagarh Committee.

²⁸ "Problems of Coordination in Agricultural Programmes", P.E.O. 1965, pp. 8-9.

²⁹ IADP, Second Report, 1960-65 pp. 12-13.

³⁰ Report on the High Yielding Varieties Programme, Department of Agriculture, Government of India, 1967, pp. 82-83.

and education are not clearly demarcated. As a consequence, expert supervision and control of the different activities on a functional basis is inadequate. Departments of agriculture should concern themselves essentially with development and extension, including programme planning, supervision over the implementation of programmes and the coordination of developmental assistance to farmers. The more specialised activities which need expertise of a different kind than is common among general agricultural officers such as research and higher education in agriculture could with advantage be passed on to agricultural universities as in Punjab and some other States. The supply functions of the departments could also be transferred to separate organisations as for instance autonomous agricultural development corporations or cooperatives or private enterprise. A close liaison should, of course, be maintained by the Department with research and education on the one hand and with the channels for the supply of the essential inputs of agriculture.

The present concentration at the highest level of decision-making even on minor matters and the rigidly hierarchic relationships between the head of the department and his junior staff leave little room for the exercise of any discretion by the latter. While the senior has little time for a thorough examination of important matters, the junior has little inducement for taking the initiative. The compartmentalisation of different technical divisions in the department results in a lack of communication between them and lack of knowledge of what is being done in one department and in other departments. Correct and timely decisions on most problems of implementation require better communications between different divisions and a concerted approach to the problems that arise.

FUNCTIONAL INTEGRATION AND UNIFIED CONTROL SET-UP

The most important measure of reorganisation that is needed for the efficient implementation of agricultural programmes is to combine and integrate all development activities in agriculture and in fields closely linked to it under a single department of agriculture and rural development. The Ram Subhag Singh Committee (Working Group on inter-departmental and institutional

coordination for agricultural production (1963) recommended the establishment of an integrated department of agriculture and rural development with a common Secretary-cum-Commissioner thus recognising the need for functional integration for sound policy making and its effective implementation. The Committee's recommendation was in reality an adaptation of the earlier model of a development committee and a Development Commissioner set-up in the States established on the recommendation of the Planning Commission. At the headquarters the committee suggested the setting up of two agricultural production coordination committees one at the ministerial level and another at the secretariat level presided over by the Chief Minister and Chief Secretary respectively. Agricultural production committees of the Zila Parishads and Block Samitis were to be set up as counterparts at district and block levels, and production officers and the BDO to assist them for coordinating and supervising the implementation of agricultural programmes.

The Committee's recommendations have been accepted by all the States. But in most of them they have been implemented only in part. An integrated department of agriculture has not been set up in any State. Agricultural coordination committees are stated to be functioning in all States but hardly with any vigour. In some States, agricultural production commissioners have been appointed; but contrary to the recommendations of the Committee Development Commissioners have also been retained. The different departments concerned with agriculture have their own secretaries and the Agricultural Production Commissioner acts merely as the principal secretary. The necessary integration of functions has not been achieved by these changes. Effective coordination of agricultural activities has not been achieved through the operation of the new committees. Except in one or two states the committees are merely formal bodies meeting infrequently. It is necessary that coordinating bodies should not be satisfied with periodical or *ad hoc* meetings transacting formal business and passing down general instructions to numerous agencies, and sending out reminders, or holding meetings for a subsequent review. This leads only to more paper work and hardly leads to any action. Coordinating bodies

should be authorities to whom difficulties experienced in implementing programmes are continuously referred to be immediately solved. The Ministers' and Secretaries' Committees should be bodies capable of such action.

It has been brought out in a recent study that communication between operating personnel in the field and directing or coordinating personnel is inadequate. The channels are clogged by too much paper work and movement of files between different agencies both at the headquarters and in the districts. There is a need for sooothing up and improving lines of communication both vertically, horizontally and diagonally.³¹

Delegation is the necessary complement of integration and centralisation. It is at present limited in scope and confined to the existing administrative structure or hierarchy from the department to the directorate; from finance to the administrative department; or from the senior to the junior officer. It has been stated that the absence of adequate delegation of financial and administrative powers has greatly handicapped the Collector, the district agricultural officer and the project officer in carrying out their responsibilities in the IADP districts and seriously delayed the execution of programmes. Due to lack of power the officer on the spot is often unable to act. A consequence and a cause of the absence of delegation is the concentration at the headquarters of senior operating personnel who are better located in the districts for effective programme implementation. Such location would facilitate delegation. The essential principle of delegation should be that responsibility should be matched by adequate powers if programmes are to be implemented and accountability is to be real.

Delegation need not be confined to departmental agencies. Autonomous or semi-autonomous district or area development corporations, credit corporations, etc., should also be set up to deal with such functions as the supply of inputs and various services and credit. Such institutions would serve to lighten the burden of the headquarters offices, would be less bureaucratic

³¹ Donald C. Pelz: *Coordination, Initiative and Delegation in Agricultural Administration* (Mimeographed), Survey Research Centre, University of Michigan, Ann Arbor, 1967.

and responsive to local needs. The department could thus function as a coordinating agency in regard to such services and more effectively guide and supervise its own field agencies.

A serious drawback that has been noticed in operating the IADP programmes has been the high turnover of key personnel above the level of the Village Level Workers in the last few years, and delays in filling key positions of subject matter specialists and other technical and executive personnel. The continuity of tenure for sufficiently long periods of such personnel is essential if programmes are to be 'sold' to the people without whose co-operation they cannot be implemented and for the personnel to acquire the knowledge of local conditions that is necessary.

The implementation of programmes has been also seriously affected by the absence of specific assignments of tasks and the failure to enforce the accountability of the personnel responsible for their fulfilment. If incentives and good performance have been lacking in programme administration, also bad performance or neglect are hardly ever punished. A toning up of the administration in regard to discipline is a vital need.

The machinery of agricultural administration has to be shaped to suit the functions it has to undertake. In its reconstruction the overall structure, internal organisation and management, procedures, delegation, communication, initiative and responsibility must receive due attention and it is important that administrative problems should be dealt with as a whole rather than piecemeal.

UNION-STATE RELATIONS IN AGRICULTURAL DEVELOPMENT

N. SRINIVASAN

THE CONSTITUTIONAL DIVISION OF POWERS AND AGRICULTURE

The Constitution has placed most powers relating to agriculture in List II of the Seventh Schedule which enumerates the exclusive powers of the States. These include all aspects of agriculture and animal husbandry, water supplies, irrigation and drainage, rights in land, land records, improvement and colonization, land revenue, taxes on agricultural income and succession duties on land, agricultural credit and the relief of agricultural indebtedness. The production, supply and distribution of goods, trade and communications within the States, education, local government and cooperatives all of which concern agriculture intimately are likewise included within the exclusive sphere of the States. The object of the framers of the Constitution was clearly to make the States directly responsible for all matters that concern the development of agriculture and the welfare of the rural population.

Agriculture is not specifically mentioned among the exclusive powers of the Union Government enumerated in List I or among the concurrent powers in List III of the Seventh Schedule except for Entry 33 relating to the production and trade in foodstuffs, raw cotton and jute, etc.¹ Nevertheless the powers and responsibilities of the Union Government in the field of agriculture are substantial and important. Its powers in the field of agriculture flow from its powers over commerce, industries, finance and taxation, banking and insurance, inter-state rivers, standards of higher education, etc., in List I and social and economic planning, labour relations, price control, the production and distribution of foodstuffs, raw cotton and raw jute and other entries in the Concurrent List, List III of the Seventh Schedule. The

¹ A fuller discussion of the subject will be found in Chapter 1.

overall control of the national economy vested in the Union Government by the constitutional distribution of powers makes it responsible in a general way for agricultural as well as for other fields of development.

The responsibility for the development of agriculture is thus shared between the Union and the States. The Union's powers are essentially powers of coordination rather than of direct administration. The formulation of national policies laying down standards of higher education in agriculture, etc., and assisting States with technical advice and encouragement and finance are Central responsibilities. The division of responsibility between the Union and the States makes cooperation between them essential for the solution of all major problems in agriculture such as increasing agricultural production, relief of rural indebtedness, the prices of agricultural commodities, marketing, food, etc. A national food policy, for example, requires a well coordinated programme of production and imports, procurement, control of movement, distribution and price policies. The powers of legislation in these matters are vested partly in the Union and partly in the States. Their joint and coordinated action is needed if the problem is to be solved. For the execution of the greater part of its programmes the Centre has no administrative machinery of its own in the field and depends entirely on the administrative machinery of the States.

FORMULATING AGRICULTURAL DEVELOPMENT PROGRAMMES

The Centre's concern for agricultural development has increased largely since the Second World War and is the direct outcome of successive food crisis through which the country has been passing since the Bengal Famine of 1943. It has been forced to take the initiative in evolving national policies for the modernisation of our agriculture through the application of science and technology and in their implementation. The Centre's interest has increased with national planning. Since the adoption of the First Five Year Plan in 1951, the coordination of plans of development in the field of agriculture as in others and securing their implementation in practice have in large measure become the responsibility of the Centre.

The Centre has the leading role in the formulation of national plans of economic development for several reasons. Centralised decision-making is a necessary concomitant of planning. The best use has to be made of the limited resources of the country by their proper allocation among schemes of development and determining the right priorities for the optimum and balanced development of the country as a whole. This would hardly be possible without ultimate control of decision-making by the Centre. The Centre's influence is in part also the result of its greater command over the resources needed for the plan and its power to make discretionary grants for securing plan objectives.

The National Development Council which consists of the Chief Ministers of all the States, Central Ministers and the Planning Commission is the highest policy making body in the country. It lays down the guidelines for the plan which is formulated after consultations between the Union Ministries, the Planning Commission and the representatives of State Governments. The initiative in these discussions has tended to be with the Centre. The size of the plan, the schemes included in it and sectoral priorities largely follow the Centre's proposals. The Centre here includes the Ministries and the Planning Commission. State Governments have been unable to influence the final shape or content of the plan in any significant way. The planning of agriculture, irrigation, power, education, health, etc., falls within the scope of State plans. This is essentially the work of the States. But when these come to be incorporated in the National plan, they undergo such radical changes that the participation of the States in the planning process becomes little more than nominal. Partly the blame must fall on the States themselves which usually present plans for which resources do not exist, and which are put forward for the purpose of bargaining for larger allocations from the Centre.

The commitment of the States to the execution of the national plans is not secured in full measure. Nor is any lively interest in its successful implementation created in Panchayati Raj institutions and organised farming interests through consultations with them in the course of formulating the plans. It is

true of course that effective State participation and planning from below are difficult to achieve under the conditions of stress and limitation of time in which the plan must be finalised. But these tasks should be attempted. A greater measure of participation and involvement in plan formulation on the part of the States requires greater attention on the part of the Central Ministries and the Planning Commission to their views and their appraisal of their own needs, priorities and special problems. The Centre's decisions should be based on a more objective assessment of the financial and administrative capacities of the States than has been the case in the past in prescribing schemes and targets of production or the resources to be mobilised by the States. The Centre's decisions in these matters often appear to be arbitrary leaving behind them a sense of grievance.

It is particularly important that a sense of participation and involvement in the Plan should be extended down to the field level in agriculture. Action here depends on the decision of over sixty million farmers and a host of institutions, organisations and interests organised and unorganised. The States should consult Panchayati Raj institutions, Cooperatives and representative organisations of farmers in formulating their draft plan. Substance must be given to the concept of planning from below.

For this the States need adequate institutional arrangements. One of the reasons for the failure of the States to make an impact on the final shape of plans is the weakness of their machinery for plan formulation. Planning is done departmentally and is *ad hoc*. There is no provision for the consultation of interests at lower levels. Long-term planning requires competent technical staffs which States have been reluctant to employ. They are also needed to coordinate departmental plans and to review and evaluate performance. An adequately and competently staffed policy and planning unit with these functions, attached to the Chief Ministers' offices, would result in better planning in the States. The form of such a unit needs careful consideration. It should not be a replica of the Planning Commission and result merely in the creation of a new bureaucratic apparatus.

States have been genuinely handicapped in planning for a second fundamental reason—the lack of resources. They depend

on Central assistance to a great extent for financing their development programmes and only to a slight degree on resources they themselves raise. The quantum of assured Central assistance over a plan period is not known to them in advance. Their planning is done in a vacuum as it were and tends to be somewhat unrealistic. Large plans and programmes are presented for bargaining with the Planning Commission for extracting the maximum of Central assistance. In its final shape the State plan as a consequence tends to be a collection of ill-assorted schemes rather than an integrated plan.

A third reason is the generally narrower and state-centred outlook that States tend to adopt in planning for development and the lack of dynamic leadership. This leaves the initiative to the Centre. Imaginative new programmes like the IADP, the IAA, the HVP or multiple cropping and other programmes have been introduced by the Centre. The major policy innovations have all emanated from the Centre.

Central and State views on the adoption of large schemes or the targets of coverage by new programmes tend to diverge widely and there is not a little difficulty in arriving at agreed programmes. The Centre's proposals have to be either Central Sector Plans or Centrally sponsored plans before they secure the acceptance of the States. In general the Centre finds it difficult to persuade the States to adopt new schemes without financial inducement. The urgency of programmes is viewed differently by the Centre and States in not a few cases, *e.g.*, in regard to ayacut development in the different major irrigation projects or increased areas of coverage under the new schemes, etc.

It has been noticed that the States are reluctant to add to their technical staffs the personnel needed to handle the problems of forward planning or to execute programmes. Any suggestion by the Centre as to the staff needed for the implementation of programmes is resented by the States as regimentation. Even the training of their staff is not sometimes accepted by them. Part of the resistance of the States can be explained by the unhappy experiences with Community Development which has left the States with the burden of supporting a large staff without definite functions in the field. For the proper planning and

execution of development programmes it is necessary for the States to take an objective view of their needs of staff and to increase it especially on the technical side.

The machinery of planning at the Centre requires strengthening in some respects and pruning in others. The experience of the formulation of the plans has brought out the need for adding to the capacity of Central Ministries for planning through the creation of separate planning units. The nucleus of such a unit is already available in the Ministry of Food and Agriculture in its economic and statistical and other technical and expert services. The planning unit should include the top policy advisers in the Ministry, *i.e.*, the Secretary and other senior officers and should be assisted by technical experts. The unit should have adequate and qualified supporting staff for detailed operational planning. The Minister should be the Chairman of the body and the Secretary should act as his deputy. It should maintain the closest liaison with planning staffs in the States. The unit should undertake both the planning function and the review and evaluation of the plan in operation.

An adequate organisation for planning in the Central Ministries would render superfluous much of the bureaucratic structure of the Planning Commission which at present reviews the work of the Ministries in planning. This is neither at a higher technical level nor based on a larger operational experience for the Planning Commission has not the staff with the requisite competence to undertake such work. The Planning Commission should devote itself to questions of broad policy at the highest level and the coordination of the plans of different Ministries and departments. Its function should be to serve as the staff agency of the Minister of Economic Affairs, who is a member of the Cabinet and responsible to Parliament or the Cabinet. Such an arrangement is more in consonance with a democratic system of government than the Planning Commission as at present constituted, *i.e.*, an independent extra-constitutional and quasi-political agency.

Working Groups consisting of senior officials and specialists from the Ministry of Food and Agriculture, the Planning Commission and other Ministries concerned—some twenty-five of

these bodies have been constituted in the Ministry of Food and Agriculture for the Fourth Plan—are largely used for preparatory work for the Five Year Plans. It is on the basis of their studies and recommendations that plans are formulated. It is suggested that these Working Groups should function under the Policy and Planning Staff of the Ministry or Department and their membership should include a larger number of officials with recent field experience from the States than at present.

THE IMPLEMENTATION OF PLANS

It is in the field of implementation of development plans that Union-State relations need closer attention as it is here that development programmes get bogged. The Union Government has often been unable to secure action by the States to carry out programmes as scheduled under the Plan. Physical targets are not realised while financial outlays exceed the provision and time schedules are upset. Plan priorities are not respected and funds made available by the Union Government are often diverted to other uses, as for example, the aid given to agricultural production programmes being utilised for the social services. Nor is there a satisfactory reporting system on the progress of plan implementation.

States complain that their freedom of action is severely restricted by leisurely procedures of review and sanction, insufficient delegation of both financial and administrative powers and detailed control. States have also complained with a good deal of justification of the non-availability of inputs, credit, foreign exchange and of controlled commodities needed by them for the implementation of agricultural programmes and of staffing patterns imposed on them. These criticisms need to be met and every effort should be made to assist the States to overcome the difficulties experienced by them.

PROBLEMS OF COORDINATION

In a federal government decision-making in regard to any programme of development is necessarily at different levels. At all the levels, Union, State and district, a number of different ministries and departments is involved in planning and executing

developmental programmes in agriculture. Independent departmental hierarchies for the different aspects of development work reaching down to the district, block, and village create problems of both coordination and delegation. These are among the key problems to be solved.

Coordination is necessary both where decision-making powers are distributed horizontally among equal and independent agencies and vertically where they are placed at different levels of single hierarchy of a ministry or department. It was pointed out by the late Dr. Appleby that the efficient execution of development programmes requires "something like a straight line administration" where orders are clear and are promptly carried out at all the levels of the administrative hierarchy, reported, appraised, corrected where mistakes occur and the entire programme is executed within a time schedule. This is lacking.

In planning and carrying out development programmes in agriculture, a number of separate ministries and departments are involved both in the Union and the States and at the secretariat, district and block levels. At the Centre these are the Ministries of Food and Agriculture, Community Development and Cooperation, Irrigation and Power and Finance, the Planning Commission and a number of autonomous and semi-autonomous agencies within the Ministry of Food and Agriculture itself. Other Ministries are also involved in certain aspects as for instance, the Ministry of Commerce in plantation crops. Extreme departmentalism and defective communications between departments make coordinated and quick action in carrying out a programme difficult.

In the States also the number of departments concerned with one aspect or another of programmes of agricultural development is large. Agriculture, forests, animal husbandry, planning, finance, revenue, cooperation, public works, electricity, industries and panchayati raj are among these. The field agencies of the departments are also like-wise concerned with agricultural programmes at the district and block levels. Here the defects are also the same, i.e., inter-departmental jealousies and lack of communication and cooperation between the different agencies.

The coordination of activities within the departmental hierarchy raises problems only where a multiplicity of subordinate and autonomous or semi-autonomous agencies are involved and is relatively easy to achieve. The major administrative problem is not so much one of coordination as of adequate delegation of authority and of communication, reporting and review.

Coordination between different Ministries, the Planning Commission and other agencies at the Centre, coordination of different development departments at the state headquarters, and at the district and block levels; between the Union and States and between States *inter se*, however, present difficulties both in the stage of the formulation of programmes of development and in the stage of their implementation. The problems of coordination are most acute at the district level where the local officials of the different departments do not cooperate, communication is deficient and action is possible only through the intervention of the District Collector. At this level coordination is essential for the execution of programmes. Many of the difficulties in the field in plan implementation would seem to be the result of an excessive departmentalism. This has to be remedied.

ADMINISTRATIVE DELEGATION

There is need for the delegation of administrative and financial powers both within the administrative ministries and departments and to personnel operating in the field for effective plan implementation. The absence of delegation results in a shirking of responsibility, inaction and delay. Delegation must be combined with accountability and with an adequate system of "progressing" projects and works under execution. Operating departments should themselves maintain a record of progress in the implementation of programmes and report at regular intervals. It has been observed that reporting by the States to the Union Ministry is both irregular and incomplete. Full reports are essential and these should be secured. A periodic evaluation by independent agencies is one of the most urgent needs for assessing the success of programmes and administrative shortcomings and needs. Official reporting in prescribed forms hardly

enables such an appraisal of a programme. The organisational needs for the execution of programmes in staff management and supervision, arrangements for the supply of materials in a regular flow where and when needed and in the required quantities and time schedules need to be worked out in advance in consultation with the States. There should be a constant review of these both at the Centre and in the States.

ADMINISTRATIVE REFORMS

The problem of expediting action in the States in fulfilling the targets of plan schemes is still largely unsolved and needs attention.

The reforms necessary for securing the more speedy and efficient implementation of agricultural programmes are briefly the following:

- (i) Improvements in the machinery for coordination, communication and liaison between the Centre and the States.
- (ii) Improvements in the procedures for administrative and technical scrutiny and sanction of projects, financial sanctions and release of funds. . . .
- (iii) The provision of support for agricultural schemes from allied programmes.
- (iv) Improvements in the arrangements for the supply of scarce inputs and advance information to the States about their availability and about the quantum of financial help from the Centre.
- (v) Adequate arrangements for the review of the progress of plan schemes, supervising schemes under execution and appraisal and independent evaluation after the completion of the schemes.
- (vi) A proper definition of the spheres of responsibility of the departments and agencies involved in the execution of specific projects and sanctions for enforcing such responsibility.
- (vii) Adequate delegation of administrative and financial powers to operating personnel in the field.

There has been an increasing awareness of these problems

on the part of the Centre especially in the last few years and several attempts have been made to solve them. The Working Group on Inter-departmental and Institutional Coordination for Agricultural Production (The Ram Subhag Singh Committee, 1963) made a number of recommendations to secure coordination of agricultural development programmes at all levels of Government. Most of these recommendations have been accepted by the Union and State Governments. They have not been, however, effectively implemented.

In accordance with the Committee's recommendations a high level Agricultural Production Board has been constituted at the Centre with the Union Minister of Food and Agriculture as Chairman and consisting of the Ministers for Irrigation and Power, Community Development and Cooperation and the member in charge of Agriculture in the Planning Commission. The main task of the Board is to speed up the implementation of programmes of agricultural production and in allied fields. It is enjoined to secure effective and continuous coordination between concerned ministries at the Centre, review the progress of schemes, ensure supplies and services, locate and remove difficulties and take other measures for the speedy and effective implementation of development programmes.

At the State level the Working Group suggested that greater use should be made of the Coordination Committees of Ministers and Secretaries presided over by the Chief Minister and the Chief Secretary respectively. These Coordination Committees are reported to be already functioning in all the States. The Committee recommended the delegation by the State Cabinet of full powers to its Coordination Committee and the integration of all the departments and agencies concerned with agricultural production and Panchayati Raj into a single Department of Agriculture and Rural Development. The Secretary of the integrated Department was to be designated Commissioner for Agricultural Production and Rural Development and made responsible for coordinating the work of the heads of all the departments concerned with agricultural production such as Directors of Agriculture, Animal Husbandry, Fisheries, Panchayati Raj and the Registrar of the Cooperative Societies.

The Committee recommended further that the Agricultural Production Committees of the Zila Parishads or *ad hoc* Committees of non-officials where Zila Parishads are not functioning and consisting of district officers of all development departments with the Collector as Chairman and the District Agricultural Production Officer as Member-Secretary should coordinate the activities of all departments concerned with agricultural production. The Coordination Committee at the district level should "consider and approve a coordinated agricultural production plan for the district, assign specific tasks and responsibilities to the officers and institutions concerned, receive and review progress reports from them and remove any bottlenecks or difficulties". The Committee recommended the setting up of an Agricultural Production Committee of the Panchayat Samiti with the Block Development Officer as its Member-Secretary including a few elected members and all Extension Officers at the Block level.

The coordinating bodies though they are said to be set up in all the States have been active only in a few. In most States they do not function at all. Serious thought must, therefore, be given to the problem of activating them or alternatively to devise more effective machinery for coordination.

Central Teams consisting of senior officers of the Ministry of Food and Agriculture and the Planning Commission have been visiting the States once a year since 1963 to study on the spot and to report on the progress of the implementation of development programme to fix targets, estimate the inputs needed and to follow up these at the Centre. After a visit to all the States in 1963 the Central Teams expressed the view that :

".... unsatisfactory administrative and organizational arrangements were by far the most important single factor for inadequate progress in the sphere of agricultural production."

The Central Team as an institution for assessing progress and assisting the States in the implementation of development programmes and for encouraging them to further action is potentially of great value. It has the incidental advantage of acquainting Central officials with action condition in the field with

which they are not often familiar.

The setting up of regional offices and the appointment of liaison officers of the Union Ministry in the States to supervise and speed up the execution of development programmes have been suggested as a means of securing a closer liaison between the Centre and the States. These suggestions have been partially carried into effect by the appointment of liaison officers at the Centre and at some regional centres for seeds (1966) and for extension (1967). In the light of the experience of Central and regional food commissioners in the past (1948) it would be naive to place too great a reliance on this experiment. Properly organised and staffed and linked with the Centre and the States regional offices would serve a useful purpose.

A suggestion that was recently put forward is the creation of an *ad hoc* task force of senior administrators whose main job would be to expedite the execution of crash programme of food production which would naturally include most agricultural development programmes.² It may be noted that something like it is already in existence in the IADP unit of the Directorate of Extension in the Ministry of Food and Agriculture. The suggestion is worth examining.

These experiments of the Union Government with institutional devices bear witness to its sense of responsibility and its genuine concern for implementing development schemes. These, however, have been only partially successful. The search for more effective methods of assuring the implementation of plans must continue.

In this context a suggestion that is worthy of serious consideration is that in regard to plans of development in any specific area, financed wholly or in part by the Union Government, States might be required jointly with the Union Government to work out a schedule of operations setting down clearly the responsibilities of the two governments and containing built-in sanctions for the fulfilment by both governments of their respective obligations. This is no new idea. Such agreements have been resorted to in the United States and have been found useful in developing

² The Statesman, March 3, 1966.

programmes of action in many fields. This is a flexible device and had much to commend it. Where the purpose is agreed to and the agreement is freely negotiated between the Centre and the States, there should hardly be any objection to it. The resulting agreement is merely a formal record of the action to be taken by the governments according to an agreed schedule. In the principal fields of agricultural activities such as research, education, extension, supply of inputs—indeed in regard to every major programme where responsibilities have necessarily to be shared between the Centre and the States, it will greatly facilitate the implementation of the programme if the responsibility of the cooperating governments could be defined precisely, the targets, time schedule and the phasing of work determined, financial commitments of the Union and the States made clear and provision is made for adequate reporting and evaluation. Such a formalisation of administrative relations is necessary for securing a better execution of plan schemes and for fixing responsibility for lapses and failure.³

The institutional and other arrangements suggested above are conceived within the framework of the federal system. What is aimed at is to make the States primarily and more directly responsible for the proper implementation of development programmes. The Union Government's proper sphere is to provide financial support to State systems exercising only high level supervision and granting all possible freedom of action to the States. In a country so large as India and taking into account the scarcity of resources in relation to the population, it would appear that strongly decentralised and the simplest possible organisational patterns are likely to yield results.⁴

In turn the States should devolve much of development work in agriculture on local representative bodies which now cover the entire country. Programmes which could be so devolved are seed multiplication and distribution, compost making and

³ This has been accepted by the recent Conference of Chief Ministers, July, 1967.

⁴ Mr. Victor Bruce of the F.A.O. in a letter to the author.

fertilizer distribution, improved implements and farm machinery, soil testing services and conservation measures. The necessary technical assistance and finance should be made available to them and States should assure through inspection the proper performance of the functions by local authorities.

The adequacy of the administrative machinery in the States for the implementation of development programmes needs to be re-examined. A reorganisation to make State Governments more development oriented and technically better equipped, a streamlining of administrative procedures, as well as changes in attitudes towards the public and democratic local authorities would seem to be indispensable. Administrative reform at the State, district and block levels is a matter of vital importance.

FINANCIAL RELATIONS

Financial relations between the Union and the States cover a wide field and can only be very briefly touched upon here. The Constitution divides both the powers of taxation and revenues between the Union and the States. From the point of view of taxing powers and resources the States are in a weaker position than the Union. Their functions are not matched by commensurate independent sources of revenue. In this respect India is not unique. The Constitution provides for a devolution of revenues from certain taxes levied and collected by the Union and for grants-in-aid both obligatory and discretionary. The transfer of resources from the Union Government to the States is to be made in accordance with the recommendations of the Finance Commission which is appointed once every five years. The Finance Commission is empowered to determine the respective shares of the Centre and the States of the taxes to be divided and the principles of grants-in-aid made by the Centre to States.

Since the adoption of the Five Year Plans the resources which the States obtain from the Centre on the basis of the recommendations of the Finance Commission have progressively declined in importance and are much less than the discretionary grants under Article 282 of the Constitution and loans for development

schemes under the Plans. The latter have become the mainstay of the States in financing their development programmes. Between the demands of the States for funds and the grants actually made available by the Planning Commission there is always a gap. As the grants are discretionary and are in part the result of bargaining there is some ground for complaint by the States.

The method of financing schemes of development has been evolved since 1950-51 on the basis of experience. Schemes of development have been classified as Central Sector schemes, Centrally sponsored schemes and "pattern" and "non-pattern" schemes of the States. Central Sector schemes are wholly financed by the Centre and Centrally sponsored schemes predominantly so. The former are implemented directly by Central agencies and the latter by the States. Central assistance varying from 25 to 100 per cent partly as grants-in-aid and partly as loans, is given for pattern schemes. Pattern schemes are a device to induce States to take up schemes of high priority. Non-pattern schemes are financed and implemented by the States themselves.

Grants determined in this manner involve in some degree a departure from the principle of need, since their primary aim is optimum development in terms of the Plan rather than equity. The approach to investment is selective, larger resources being devoted to the development of areas where they promise the best returns in production. In the long run, however, when the country has advanced the imbalance would correct itself.

The second area of finance which needs attention is that of procedures for sanctioning schemes and making grants. Significant changes have taken place since 1951 in the procedure for sanctioning schemes. Between 1951 and 1958 pattern schemes taken up by the States were subject to specific, scheme-wise, administrative and financial sanctions. This led to long delays and was given up in 1958. Between 1956 and 1961 financial assistance was made under broad groups of heads of development and States were given freedom to take up any programme for implementation included in the Five Year or Annual Plan for implementation, without specific sanction. Technical and financial scrutiny of schemes

with a few exceptions are left to the States themselves. The reappropriation of expenditure within a single head did not require Central approval, but where it related to two different heads it had to be referred to the Centre and its prior concurrence obtained.

It was found that under the system as it operated readjustments in financial allocations were not reported in time and that there were departures from plan priorities. To remedy these defects certain changes were made in the procedure during 1962-63. The number of patterns was reduced and schemes were classified as pattern and non-pattern schemes; sub-heads of development were instituted, and Central approval was made necessary for reappropriations. In 1963-64, it was laid down that there should be no diversion of funds from the major head of agriculture, though readjustment within the major head could be made.

There has been thus considerable experiment to evolve a method of financial assistance that would ensure the execution of development programmes and the observance of plan priorities. The attempt has not been wholly successful. There are still unsolved problems such as uncertainty regarding the availability of funds over the plan period due to the system of annual plan allocations which is the cause of departures from the Five Year Plan, the issue of timely sanctions, releases of funds for Centrally sponsored schemes and the effective supervision of their implementation. Solutions could no doubt be found by further experimentation.

A further but important aspect of financial relations needs mention. Under normal conditions States should balance their revenue budgets and should endeavour to provide from their own resources for non-plan capital expenditure and avoid deficit financing. Unbalanced budgets and poor fiscal management in States seriously affect the implementation of plan schemes, and lead to an excessive dependence of the States on the Centre.

POLITICAL ASPECTS OF CENTRE-STATE RELATIONS

The constitutional and administrative aspects of Union-State relations are determined in the last resort by political

factors. The Constitution is merely an instrument and its success in achieving its purposes depends on the political forces in the country. Among these political parties are the most important. If there are no well organised and disciplined parties, if their internal relations are strained by sharp differences of views and conflicts of interests, the constitutional system itself would be endangered. Party discipline is, therefore, of fundamental importance for the working of our democratic system of government. No less important is a common approach among the parties to the problems of planning and implementing development programmes. The immediate interests of party, section or region must be subordinated to long term interests of the nation.

Since Independence the Indian National Congress has been the dominant force in Indian politics and has been in control of the Union and State Governments. This has resulted in a measure of harmony in Union-State relationships. More than any other factor, the discipline of the Congress Party and its unique top leadership have contributed to an identity of purpose and a large measure of cooperation between the Union and State Governments in planning and executing development programmes. But the degree of unity and cooperation achieved is far from adequate to the needs of the country. In spite of the unifying role of the Congress it has been difficult to evolve national policies in many areas of development, especially in agriculture, and even more difficult to secure their full implementation. Such unity as exists appears to be artificial and enforced by party discipline and the top leadership.

National unity no less than party unity has been strained by the pulls of regionalism, language, sectionalism and state loyalties. Centrifugal forces, always latent in our society and politics, appear to have gained greatly in strength during the years since Independence. These are reflected in Union-State relations even when the same party is in control of the Union and State Governments. As evidence we might refer to the excessive demands made by State Governments on the Centre, in their generally unconstructive and occasionally

non-cooperative attitude in solving national problems, their reluctance to accept and carry out policies framed in the national interest observable in State politics since Independence. These tendencies need to be curbed. The Centre and States should come together and cooperate in the common task of planning and development.

What is urgently needed today in the States as well as at the Centre is a national outlook that transcends regional frontiers and regards with equal concern the needs of every part of the country and of every group in it and is willing to accept and carry out loyally policies designed in the interests of the nation as a whole even if it involves some sacrifice. Such an outlook is to the success of our national development programmes and policies. Regional pulls and pressures should be resisted and the temporary advantages that may result from the championship of the particular interests of the States should be subordinated to the larger interests of the nation. There must be a sincere desire on the part of the leaders in the States to cooperate with the leaders at the Centre in evolving national policies of development and in their implementation. Such cooperation involves no sacrifice of the real and long term interests of any State. Without a far greater degree of co-operation between the Union and State Governments and between national and state leadership than has been the case in the recent past it would indeed be difficult to plan and carry out development programmes in any field and especially in the field of agriculture where the role of the States is so much more important than that of the Union.

The suggestions of this paper for the improvement of the machinery of planning and administration of programmes of agricultural development may be summarised as follows :

- (1) The effective participation of the States should be secured in formulating development plans and their full commitment to their implementation assured.
- (2) Steps should be taken to associate Panchayati Raj institutions, cooperatives and farming interests in formulating plans.

- (3) A correct assessment of the administrative and financial resources of the States should be made before targets of production are set for them and entrusting the execution of plans to them.
- (4) States should equip themselves with adequate planning machinery and technically qualified staff. This should be attached to the Chief Minister's office and should advise the Government on planning, supervise the implementation of plan schemes and evaluate performance.
- (5) The Centre should intimate to the States in advance the financial resources and scarce inputs that would be made available to them to enable the latter to plan effectively.
- (6) The creation of a separate Policy and Planning Unit in the Union Ministry of Food and Agriculture is needed to strengthen the capacity of the Ministry to formulate plans, to supervise their implementation and to evaluate them.
- (7) The work of the Planning Commission should be limited to the coordination of plans formulated in the Ministries. It should serve as the staff agency to the Minister for Economic Affairs and the Cabinet.
- (8) Working Groups doing the preparatory work on the plan should work under the proposed Policy and Planning Unit of the Ministry and should include a greater proportion of officers with recent field experience.
- (9) For speeding up the implementation of the plan the existing practice of visiting Central teams should be continued. The alternative of a Task Force of senior administrators to expedite work on specific programmes should also be tried.
- (10) The relations between the Union and the States in regard to plan implementation need to be placed on a formal basis. Agreements laying down a schedule of operations, defining clearly the responsibility of the Union and the State Governments should be made in

regard to development projects financed wholly or in part by the Centre.

- (11) The provision of efficient machinery to secure coordination of agricultural programmes is necessary as suggested by the Ram Subhag Singh Committee. The coordination machinery which has been set up should be activated where it is not functioning.
- (12) There should be adequate delegation of financial and administrative powers to operating personnel all along the line from the State headquarters to the field.
- (13) Development work in agriculture should be decentralised and elected local authorities should be made agents for the execution of projects within their area and competence.
- (14) The States should take greater responsibility for plan implementation in the field of agriculture, as it is essentially within their field of competence.
- (15) The Centre should confine itself mainly to financial and technical support and high level supervision.
- (16) The adequacy of the administrative machinery of the States at all levels for planning and executing development programmes needs to be examined, and gaps filled.
- (17) On the financial side procedures for the issue of sanctions should be improved; advance information on the availability of finances for plans should be given and these should cover an entire plan period. The States should balance their revenue budgets.
- (18) The immediate interests of party, section and region need to be subordinated to long term national interest.

Summary of Discussions

The broad conclusions of the Seminar were: (1) The planning process needs to be improved to facilitate this participation by the States in the process. (2) States need better planning machinery. (3) the States should be assured in advance of the finances

needed for development for the plan periods ; (4) A great deal more of Central participation in the implementation of development programmes is necessary and the States should be persuaded to accept it ; (5) A continuous over-sight of plan implementation by Central agencies is needed and there should be material exchanges between Central and State officials on this problem of effective plan implementation; (6) Agricultural policy and food policy need to be integrated; and (7) Democratic decentralisation requires corresponding changes in the machinery of agricultural administration.

The views expressed by this participant are briefly summarised below :

The first step in the process of planning is the work of the Planning Commission in making certain projections as to the future trend of demand and capital-output relationship and determining an investment pattern on the basis of the projectors. The next step is to organise working groups at the Centre which start working within the general framework laid down by the Planning Commission. In the meantime, the States also similarly organise working groups at the State level. When the reports of all these groups are received by the Planning Commission, they are examined in the light of the frame that has already been prepared, the necessary streamlining is attempted. Generally speaking, the total of the state plans greatly exceed the estimates prepared by the framers of the national plan.

The state plans are finalised after discussions with the States and an attempt is made to reduce the overall outlay to the levels envisaged earlier by the Commission and to make the States raise the requisite resources. There is an element of bargaining here. However, after the interplay of various forces, the States are informed of the final size of their plans and the resources that they are expected to raise. In this exercise, the contribution of the States is very greatly limited.

After this, we have the annual plan discussions. The annual plans have tended over the years to completely obliterate the other exercise, the preparation of the Five Year Plans. The five year targets, so far as the States are concerned, undergo a process of erosion. The process of refixation of targets and allocations in the light of the annual plan outlay is indeed a difficult task. In the process the five year targets—both physical and financial are lost sight of and the State departments are asked to prepare schemes that they can carry out which may not always be supported by operational details. The annual plan which emerges is only an exercise in the distribution of funds among various schemes without any reference to the States' performance.

As for implementation of the plan, the States sometimes interfered with the targets or made additions to their plan which are sufficiently backed by technical or financial resources. The result is that energy is scattered over a number of projects and schemes and very meagre fulfilment is registered. One can say against the States that because of the changes effected in the financial and physical targets, the discipline of planning is lost. In order to minimise this the Planning Commission and the Central Ministries will have to be more effective than they are now.

The pattern of financial assistance to the State with regard to specific schemes in which the Centre is interested is extremely complicated, and sometimes even confusing. There might be other devices that can be forged to serve the purpose of assistance. At present two Central agencies—the Planning Commission and the Finance Commission—are involved in this matter and the States because of the duality of sources of assistance manage to take advantage of the situation. Moreover there is no continuity in the examination of the States' non-plan expenditure. While considering Union-State financial relationships, we should take a total view of the financial resources of the country as a whole, and their optimum utilisation. The present method of resolving this issue through two agencies leads to an improper utilisation of resources. The pattern of central assistance to the States has led to confusion in some areas. We have, therefore, to think of

associating the States more and more with the formulation of the plans. This can be achieved if the planning agencies in the States become a replica of the Planning Commission so that reference to the Centre for advice or for sanction is reduced substantially. These bodies should have the necessary expertise, an investigation and survey agency and so on.

In plan implementation, the States have to be persuaded to take on a larger dose of Central association. An adequate reporting system and proper evaluation on an institutional basis will have to be built in the States. The reporting forms should be simplified and so devised as to suit both the States and the Centre. Arrangements should be made to review the reports from the States by the representatives of the Ministries and the Planning Commission. They should deal with the trends of progress and an objective description of the difficulties. Remedial actions will be suggested by them and subsequent action should follow.

The device of inspection agencies would appear to come into conflict with the sensitiveness of the States in respect of their autonomy. Under such conditions, it is necessary to have continuity of inspection, through teams of officers of the Planning Commission and the Central Ministries. The teams should review the performance of each State from the point of view of targets to be achieved and their reports should be discussed with the States at ministerial level.

In the matter of food policy, the Centre has been playing a more active role than in agriculture. The question arises as to how far agriculture can be left entirely to the States. Moreover, there cannot be a rational separation between food and agricultural policies. A single policy is necessary in both spheres. If this is so, then the existing Union-State relationship in agriculture must change. How far the Centre should be committed or associated in the formulation as well as implementation of programmes is a matter of detail which can be worked out. The constitutional provisions should not be allowed to come in the way of increased Union-State participation in agriculture.

There should be an exchange of administrative personnel between the States and the Centre. This will pave the way for

mutual understanding of each others' problems. Visits of Central teams to the States as also State officials to the Union Ministry and the Planning Commission should also be encouraged. We should also think of joint teams where both the Union and State officials participate. Union-State relationships should be viewed as problems of co-ordination and not control and directions. Inspections should be followed up by remedial actions and *gui dance*.

Democratic decentralisation in the States through the *panchayats* calls for a change in the organisation of agricultural administration. The responsibility of the field staff still continues to be focussed on the States which is not the way of decentralisation. The whole subject of Union-State relationship arises out of our constitution. Unless there is a common objective and the will to reach the objective on the part of the Centre and the States, the relationships will be strained. It is true that in times of crisis, there is a remarkable harmony and commonness between the States and the Centre, but this is lacking in normal times. It should be our endeavour to devise ways to evolve a more fruitful partnership.

PLANNING FOR AGRICULTURAL DEVELOPMENT

S.R. SEN

The development of agriculture involves the development of the human as well as material resources. The former involves the creation of a "will to develop" among the farmers and adoption of measures calculated to bring about a progressive improvement in their incentive, skill and efficiency. The latter involves a progressive development of the infra-structure and improvement in the material conditions for production. The two together create the appropriate climate and environment for development, besides contributing directly to the development process itself.

Development of human resources can be brought about partly by the implementation of general social and economic policies, *e.g.*, land policy, price policy, trade policy, incentives, etc., and partly by provision of education and training, extension services and research. Improvement of material resources involves measures like land reclamation, land development, soil conservation, afforestation, irrigation, drainage, supply of fertilizers, pesticides, implements, better seeds, credit, etc.

What combination of various measures designed to improve the human and material resources will lead to the optimum result will depend upon the overall resources situation, as also the general strategy of development.

The main considerations in determining policies and programmes for the development of agriculture may be briefly summed up as under:

- (1) Optimum utilisation of the resources endowment of the country from the short-term as well as long-term point of view;

- (2) Meeting the urgent requirements of agricultural products and achieving the desired targets of production; and
- (3) Setting in motion a process, especially through the progressive application of science and technology, which will lead to continuous and sustained improvement in the agricultural productivity of the country.

Of these three, it is really the last which constitutes the core of the basic strategy for agricultural development.

Policies and programmes for the development of agriculture cannot, however, be considered in isolation from the policies and programmes for the development of the economy in general. For instance, industry processes agricultural products and provides the fertilizers, pesticides and implements, that it needs, while agriculture supplies food and raw materials to industry and provides market for its products. Provision of transport, communication and power is essential for the development of both.

In considering the plan of economic (including agricultural) development, it is important first to take a long look ahead and have some idea of the perspective of development and second to determine a strategy of development before taking look at the programmes for the next operational period.

Development is a continuous process and a plan for development for, say, the next five years, must keep in view the needs and possibilities of a longer period, say the next ten or fifteen years. Planning, as opposed to *laissez faire* or a policy of drift, must have a long-term goal (*i.e.*, a perspective plan) before a view is taken of the stages (*i.e.*, five year plans) by which that goal will be reached or of the detailed itinerary for each of the different periods (*i.e.*, annual plans) in which a particular stage is to be covered.

Careful marshalling of facts and their scientific study for the purpose of formulating judgment are essential pre-requisites for determining the broad strategy for the development of the economy as a whole. The strategy may be either balanced growth or unbalanced growth. For a small country participating actively in international trade, unbalanced growth may sometimes give a higher growth rate. But in a continental type of economy

facing serious constraints regarding exports, balanced growth seems unavoidable. For such a country, maximisation of the rate of growth of the production potential may be a more desirable course than the maximisation of the rate of growth of national income, atleast in the initial period.

Within the broad strategy determined in the light of the political, social and economic considerations, the strategy as well as the plan for the development of agriculture over a given period, say five years, will depend on: (a) the rate of growth of national output aimed at; (b) the place given to agriculture in the overall strategy for the development of the economy; (c) the linkages envisaged between agriculture and other sectors, *e.g.*, industry, transport, etc.; (d) the investment proposed for the latter; (e) the current stage of development of the infra-structure, especially of items having a bearing on agriculture and the programmes for their future development; (f) the feasibility of extending the area under agriculture; (g) the rate of improvement of the agricultural productivity in different subsectors, *e.g.*, crop production, animal husbandry (pasture and fodder production) dairy, fisheries, forestry, etc., considered technically and economically feasible; and (h) demands for agricultural products which have to be met immediately, over the next five years and over the perspective period.

The pattern of investment in agriculture has not only to take care of immediate shortages but also to create production potential for the future. If the latter is not attended to, there may be quick increase in production in the short run, only to be followed by stagnation in the long run.

Generally speaking, the pattern of investment in agriculture will have to be: (i) in terms of broad sectors, *e.g.*, crop production, animal husbandry, dairy, fisheries, forestry; (ii) also functional, *e.g.*, improvement of institutional structure, general improvement of institutional structure, general improvement of production potential, improvement of productivity of particular products; and (iii) all these again will have to be a mixture of regional (or intensive) or countrywide (or extensive) programmes.

II

If the best use is to be made of the limited resources available, intensive regional programmes are likely to be the most economic and efficient in the short run. But for political and social reasons, the rest of the country cannot be completely kept uncovered nor would it be desirable from the point of view of the long-term development of the country. A good way of resolving this difficulty may be to make a judicious combination of the intensive and extensive approach by adopting, say, a three-tier pattern of development. The first tier comprises a few selected districts (or regions) which serve as it were as the "path-finders" and "pace setters" where most intensive effort is put in and where the latest lessons of science and technology are tried out by the best available personnel and with all the investment needed so as to achieve a break-through. For each district (or region) in this tier a special package not only of practices but also of works is provided in the light of its specific needs and with the objective of producing just that impact as is calculated to produce the optimum result. The second tier covers a somewhat larger number of districts (or regions) where the programmes which have proved successful in the first tier are tried out in a somewhat more extensive but less intensive form determined mainly by the availability of human and material resources. The main objective in this tier is to follow up the break-through achieved in the first tier and benefit as large an area as possible from the successes achieved by the first tier and at the same time avoid the mistakes of the latter. The third tier comprises all the other districts (or regions) of the country where the effort is relatively thinly spread and investment is conditioned by the general availability of resources after providing adequately for the first and second tiers. It may be clarified that there is likely to be considerable variation within each tier depending on the nature of the area under consideration. An intensive programme for an area suitable for, say, staple crops will be obviously different from that for an area suitable for, say, animal husbandry.

There should be a gradual movement over time from the third tier to the second and from the second tier to the first. Since

the main objective of the first tier is to carry out bold experiments and take calculated risks, there must be full failures as well as successes but as in any scientific experiment the negative results are usually as valuable as the positive results and should be counted as the price that has to be paid for the progress aimed at.

At first sight it may appear that the intensive projects in the first tier are essentially the same as the pilot projects carried out by the research institutes. But there is an important difference between the two. The pilot projects are mainly technological experiments, while the intensive projects are technological-cum-administrative experiments. The former aim mainly at testing out in the field results obtained in the laboratories. The latter aim on the one hand at trying out in a much wider area the results obtained in pilot projects not only in their technological aspects but also in their administrative aspects and on the other hand at overcoming the various socio-economic obstacles which stand in the way of progress and at overcoming them and clearing the path for others to follow. Both the number and location of the intensive projects, especially those in the first tier should, therefore, be selected with the greatest possible care and kept well within the limits of the trained personnel and key material resources that may be available.

In India, there has been a gradual change from the extensive approach to the intensive approach in the matter of agricultural development over the last two decades. The Grow More Food campaign which was started in the forties after the Bengal famine aimed at popularising a number of technological practices, *e.g.*, irrigation, fertilizer, plant protection, improved seeds, etc., throughout the country in a rather dispersed manner. No attempt was made to integrate these programmes or to develop the human resources as such. In the first and second plans an attempt was made to coordinate these programmes and also to improve the skill and efficiency of the farmers through the Community Development Project. But the effort was still rather dispersed and the emphasis on agriculture was not sufficiently intensive within the community development projects. It was during the Third Plan period that the intensive approach was first adopted in a

conscious manner, when an attempt was made to try out a package programme (including farm planning) in a few selected districts and the three tier system referred to above gradually took shape. The first tier comprised the IADP districts, the second tier comprised IAA districts and the third tier covered the rest of the country. Although the IADP districts comprised in principle the first tier, in practice it was found that they did not have sufficient impact. Therefore, in the Fourth Plan it is proposed to have a more effective impact programme (HYV Programme) in a limited area of 32.5 million acres selected within the IADP and IAA districts where the maximum possible effort and resources will be concentrated with a view to achieving a real breakthrough. Promising areas with assured irrigation will be chosen for saturation with high fertiliser responsive high yielding varieties and all the fertiliser and other supplies and services ensured. During the Fourth Plan, it is these HYV Programme areas which will comprise the first tier, the rest of IADP and IAA districts the second tier and all other districts the third tier.

When resources not only in terms of material inputs but also in terms of trained personnel are scarce, it is obviously more profitable to concentrate them in a few promising areas. On the other hand, as has been mentioned earlier, it is neither politically feasible nor socially desirable to neglect altogether the rest of the country. The question is what should be the right proportion of intensive and extensive projects and what should be their relative size and intensity. No simple answer is possible. It is in the light of the general objectives of economic development, the overall availability of resources, the minimum needs of development of different areas and the potentialities of the more promising areas that the ultimate decision has to be taken. But a clear recognition of the fact that the optimum results cannot be achieved through a uniform pattern of development for the whole country, that different patterns have to be prescribed for different areas and that a few programmes have to be very intensive so as to figure in the first tier, a somewhat larger number has to be in the second tier to follow up closely the successes

achieved by those in the first tier and the programmes in the third tier have to cover the whole of the country somewhat thinly is essential for rapid development. It is also important to recognise that the requirements of resources, human as well as material, so far as the three tiers are concerned are different not only quantitatively but also qualitatively. An extension worker good enough for the third tier will not be able to tackle the problems of the second tier and an extension worker in the first tier has to be much more sophisticated than his counterpart in the second tier. The levels of expertise and the programmes of training have, therefore, to be planned accordingly. Besides, the institutions for credit, marketing, etc., may have also to be designed differently for these different tiers. In fact there will have to be much greater administrative innovation in the first tier than in the second and similarly in the second than in the third, and the investment patterns and administrative methods have to be modified promptly as an area develops technologically, and economically.

III

So far we have dealt with the question of general strategy for agricultural development. The next question is how one should set about formulating a plan for agricultural development, once the broad strategy is agreed upon. Since the general pattern of investment for the economy as a whole and the pattern of investment in agriculture are closely interrelated, considerable forward and backward exercise will be needed before the final results can be obtained. For the first exercise in preparing a plan for agricultural development, one may usefully start with certain broad magnitudes, *e.g.*, growth of population and national income, rates of saving and investment, proportion of investment available for agriculture and important sub-sectors as given by the general planners in the light of overall socio-economic considerations and the broad objectives of development laid down by the political authorities. It should be, however, borne in mind that some of these broad magnitudes given by the general planners may require revision after the agricultural planners

have undertaken their exercises and that the final picture both of the general plan and the agricultural plan will emerge only after a process of successive approximation has been gone through.

An agricultural plan may have, no doubt, several objectives but its main objective is to step up agricultural production to certain levels considered optimum from the overall point of view. Agricultural production can be stepped up partly through extending cultivation to new areas and partly by improving the yield per unit of area and animal. So far as extension of area is concerned the claims of forests, pastures, crop production, fruit production, etc., have to be considered in a related manner. In the interest of a balanced development of the economy it is essential to ensure a balanced land use. The first step in agricultural planning is, therefore, to divide the country into a number of regions, each considered broadly homogeneous from the agricultural point of view. It will be convenient if these regions comprise groups of administrative units like districts except where even a district may have to be subdivided because, say, some blocks are hills and others are plains. The next step is to prepare a balance-sheet of land utilisation (as in Table I) for these agricultural regions as well as for the country as a whole. This should be followed by an attempt to forecast the position that is likely to obtain at the end of the plan period if no special measures were taken to disturb the natural trend in land utilisation and thereafter to consider to what extent the natural trend requires adjustment and what steps have to be taken to bring about these adjustments. So far as the land utilisation is concerned the main decision will be regarding: (a) the desired allocation as between forests, pasture, and crop farming; (b) the proportion of irrigated area and unirrigated area; and (c) extension of multiple cropping in irrigated area, first for the country as a whole and then for each region keeping in view the needs of the overall economy.

The next important exercise would be to decide upon the crop pattern and to set targets for individual agricultural products. In this exercise one can start either from the stand-point of demand or from the stand-point of production potential.

In estimating demand a distinction has to be made between demand : (a) for final consumption goods; (b) for intermediate goods, *e.g.*, raw materials for domestic markets; and (c) for export markets. So far as the final consumption goods are concerned, estimation of demand is to be made on the basis of: (i) population trend ; (ii) increment and distribution of income; (iii) income elasticity; and (iv) considerations regarding nutrition and likely or desired changes in taste. So far as "intermediate goods" are concerned, the estimate has to be made through techniques of "derived demand" analysis. So far as export demand is concerned a view will have to be taken of the likely trend of world income and trade, production plans of other countries, trade policies, export promotion measure, etc.

So far as the projection of supply is concerned, the first step would be to prepare a balance sheet of gross area (as in Table II) sown as a counterpart of the balance sheet of land utilisation. The balance sheet of gross area sown should give figures separately for irrigated and unirrigated areas for the important crops grown in the country. The next step will be to tabulate (as in Table III) the data regarding physical response (in terms of "production functions" or "yardsticks") and cost benefit ratios for different inputs or combinations of inputs available from experimental farms, case studies, or sample surveys for different homogeneous agricultural regions. This should be followed by projections of acreage, unit yield and production for each crop separately, for each agricultural region and also for the country as a whole (as in Table IV). If necessary, account may be taken of different combinations of desired practices or programmes. Thereafter consideration should be given to whether the policies that are in vogue or are proposed to be adopted will yield the results that are implicit in the production functions (yardsticks) used. If the policies are considered to be not conducive enough, some deductions should be made at the end on the basis of judgment of experts. If the policies are considered to be even more conducive than are implicit in the production functions assumed so that the initiative, enterprise and efficiency of the farmers are likely to be even better than the projections show, some

additions again on the basis of judgment may be made to the projections. In this exercise it is very important to make adequate allowance for gestation lags and also for possible slacks and inefficiency in plan implementation.

The supply projections thus obtained should be compared with demand projections and if there are serious imbalances insofar as particular crops are concerned, alternative ways of meeting these imbalances will have to be considered. At this stage comparative costs of various alternatives, inter-crop, inter-regional as well as international, should be carefully looked into. In some cases it may be more economical to meet the shortage by import from some other countries and pay for the same by deliberately producing a surplus of some other commodities in which the country enjoys comparative advantage. The projections thus obtained should be tested for: (a) acceptability, (b) feasibility, and (c) consistency through judgment of experts and where necessary, pilot studies. If the tests reveal any imbalance or difficulty these should be corrected by repetition of the process of backward and forward exercises mentioned earlier.

In view of the uncertainty of weather and prices as well as the other difficulties which are inherent in programmes for agricultural development, it may be useful to fix targets in terms also of : (i) a range of outputs, (ii) average output for five years, and (iii) inputs. An attempt may be made to take care of annual variations of output through buffer stock operations and through trade. There is a view that in a country with a mixed economy which actively participates in international trade, targets of outputs of individual crops are really less meaningful than the targets of agricultural productivity especially from the long-term point of view. So long as agricultural productivity goes on improving, it does not matter very much from the points of view of development how the crop pattern behaves so long as necessary adjustments are possible through trade—inter-regional as well as international. It may be, therefore, useful to prepare an index number of agricultural production with component indices of area and unit yield and fix targets on the

basis of these indices also. Individual crop targets will, however, become relatively more important to the extent that adjustment through international trade becomes difficult for a country on account of constraints on exports and imports.

A possible alternative approach may, no doubt, be to set production targets from the village upwards instead of the country downwards. In practice, however, it is likely to be very difficult in a country like India where the villages number more than half a million. However, even if only a small sample of villages prepare local plans, this should give a valuable indication to the planners of the preferences of the farmers and the inputs needed by them in the light of which some adjustments may be made in the overall plan prepared from above. In practice, the planning procedure as has been evolved in this country is essentially a backward and forward exercise between the Planning Commission and Agriculture Ministry in the Centre and the planning and agricultural departments in the States. The district and block authorities, who are in closer contact with the villages are, however, playing an increasingly important role in successive plans.

Once the five year plan has been prepared it will be necessary to review the position from year to year and make readjustments in the targets and programmes through the medium of annual plans. From the operational standpoint, the annual plan is even more important than the five year plan in as much as the annual budget and programme of work are based on the annual plan. And it is also through the annual plan that the desired phasing of long-term programmes over the five year period is ensured.

IV

The "plan of investment" thus prepared should have as a counterpart a "plan of implementation" in terms of organisation, personnel, training, direction, coordination and supervision. While the plan of investment will provide the physical inputs, the plan of implementation should ensure the administrative

inputs. A good investment programme may be undone if administrative arrangements are poor. On the other hand, sound administration may salvage a relatively poor investment programme and may secure even better results than the plan targeted for. Close touch with the operations at the field level and readiness both to adjust patterns and procedures to the needs of the farmers and to undertake new experiments where the situation so demands are essential pre-requisites of a good plan of implementation.

In any plan, investment patterns are, no doubt, important but even more important are the human elements—firstly the farmers who have to produce the results in the ultimate analysis and who have to be not only enthused, but also progressively made efficient, and secondly the officials from the V. L. W. upwards through whom the message of the plan, the technical know-how and the supplies, have to be transmitted to the farmers. The training of extension workers and farmers and the organisational aspects of agricultural extension, the administration of specific programmes of agricultural development and ultimately the union, state, field relationship which are to be discussed in subsequent sessions of this seminar are, therefore, of paramount interest in any consideration of planning for agricultural development. But equally important is the question of providing both the farmers and the agricultural officials with the right kind of incentives. In this context the provision not only of production requisites but also of incentive goods and services to farmers and price policy, marketing policy, credit policy, land policy, education policy and wage policy deserve special attention. In fact, in a country like India where agricultural development depends upon the motivation and capacity of millions of small farmers, policies are no less important than programmes as both urge for production and the allocation of land, labour and capital as between alternative uses are largely dependent upon the former. In any planning for agricultural development, therefore, due emphasis has to be given to both.

TABLE I

Balance Sheet of Land Utilisation
(hectares)

	Past Years I, II, III, etc.	Base Period	End of Perspec- tive Plan	End of 1st Plan
1. Geographical area				
2. Forests				
3. Land under three crops and groves				
4. Permanent pastures and grazing lands				
5. Other lands not avail- able for cultivation.				
6. Arable land.				
7. Net area sown:				
(a) irrigated				
(b) unirrigated				
8. Gross area sown, <i>i.e.</i> , cropped area including multiple cropping:				
(a) irrigated				
(b) unirrigated				

TABLE II

Balance Sheet of Gross Area Sown
(hectares)

	Past Years I, II, III, etc.	Base period		End of 1st Plan	
		Irriga- ted	Unirri- gated	Irri- gated	Unirri- gated
1. Rice					
2. Wheat					
3. Cotton					
4. Coffee					
5. Fodder crops					
6. Etc., etc.					

TABLE III

(a) Area Benefited (ha.)	(b) Labour employed (no)		(c) Output		(d) Value added		(e) Surplus (value added-wage bill)		(f) Gesta- tion period
	(i) Cons- truction	(ii) Recur- ring	(i) Quantity total per ha.	(ii) Value total	(i) Total	(ii) per 100 dollars invested	(i) Total	(ii) per 100 dollars invested	

1. Land reclamation (mechanised) and settlement
2. Land reclamation (non-mechanised)
3. Soil conservation
4. Irrigation (major)
5. Irrigation (minor)

6. Nitrogenous fertilizers
 7. Other fertilizers
 8. Manures
 9. Improved seeds
 10. Mechanised cultivation
 11. Combination of 5, 6, 7, 8, 9
 12. Combination of 4, 6, 7, 8, 9, 10
 13. Package programmes
 14. Practices (including input combinations, plant protection measure, etc., of good farmers
 15. etc., etc.
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TABLE IV

	Crop Base Period	Rice End of 1st Plan
I. Acreage (ha.)		
1. IRRIGATED		
1.1 With improved seeds, fertilisers and manures		
1.2 With improved seeds and manures		
1.3 With ordinary seeds		
2. UNIRRIGATED		
2.1 With improved seeds and manures		
2.2 With ordinary seeds.		
	Total	
II. Yield rate (in kilos per ha.)		
3. IRRIGATED		
3.1 With improved seeds, fertilisers and manures		
3.2 With improved seeds and manures		
3.3 With ordinary seeds		
4. UNIRRIGATED		
4.1 With improved seeds and manures		
4.2 With ordinary seeds		
III. Production (tons)		
5. IRRIGATED		
5.1 With improved seeds, fertili- sers and manures		
5.2 With improved seeds and manures		
5.3 With ordinary seeds		
6. UNIRRIGATED		
6.1 With improved seeds and manures		
6.2 with ordinary seeds		
	Total	

Summary of Discussions

The views of the participants in this summary have been grouped under a few heads.

The Plan and the Planning Process

Just as in drawing up the programmes in the Plan there is a forward and backward exercise to achieve a balance, a similar exercise is essential for all the supporting policies and programmes as well. These should be consciously geared to the task of achieving a balance in such a way that they would not distort the long-term objective of increasing production in the most efficient manner. The supporting policies should be constant with both short-term and long-term programmes. Prices and income factors should be taken into account in these calculations.

Concentrating resources in certain areas in the first round in order to achieve a break-through in agriculture and then gradually extending the same, later to other parts of the country, is the right approach in countries like India where resources are scarce. In selecting areas for intensive development the criterion should be not only the production potential of the region but also the marketable potential and the surplus.

In agricultural planning an attempt should be made to coordinate the different agencies dealing with the farmer and to link these with area planning. It is necessary to mark out agricultural regions even within the States and to have in terms of those regions a somewhat broader strategy of development for land use and for cropping patterns which will serve best. In agricultural planning more has to be done at the ground level than is the case at present. Attention has not been paid to planning that is appropriate to different regions. This is necessary because in different parts of the country we have a variety of situations, soils, rainfall, man-land ratio, crop patterns and different potentials for development. Drawing upon the experience of the more advanced areas in the country a great deal more could be done to improve agricultural productivity.

While planning for agricultural productivity the rural problem as a whole should be taken into consideration as agriculture and the rural problem are inter-connected and inseparable. This balance-sheet approach to agricultural planning suggested in the Paper is most useful especially from the point of plan coordination. The agricultural plan should aim at the best utilisation of land by improving crop patterns. The best yields of crops should be aimed at.

Questions of strategy, long-term or short-term plans and price policy are dependent more on political decisions than on academic or administrative considerations. The commitment of political parties to agricultural development should be secured. It is essential to consider whether the targets set are politically feasible.

Perspective planning is in terms of physical targets and only at the implementation stage these targets are translated into financial targets. There is a large difference between physical and financial targets. Agriculture is entirely in the private sector and there is no direct control by the Government. Therefore we cannot plan for agriculture as effectively as for industries. It is through a price policy that Governments can achieve some measure of control over agriculture.

Planning at district and area level should form the central part of agricultural planning. Area planning is necessary. It is more useful to use cartographic techniques in area planning than statistical methods.

There is at present very little facility for agricultural planning in the States. A cell for planning should be created in every State.

Finally in planning the nutritional requirements of the people should be borne in mind. These should be worked into the plan as, for example, in determining the cropping pattern, rotation or in developing subsidiary occupations like dairying or fish culture.

Availability of Inputs

The supply of fertilizers, improved seed, different inputs assumed by the plan implements, tractors, spare parts and servicing

facilities for tractors and machinery has not been available. Sufficient credit is not also available to the farmer. Cooperative credit alone is not enough. If the required inputs are not made available the programme of increased production falls. The prices of fertilizers are very high. The availability of physical inputs and the prices of these inputs are central issues. Planning for industrial development has been faulty in that the needs of agriculture had not been kept in view.

The shortfalls in the supply of inputs, like fertilizers, insecticides, etc., are not the result of any failure of agriculture but due to the failure of other sectors.

In the implementation of programmes states have a big role in coordinating or ensuring the functioning together of different agencies implementing linked programmes.

The supply of various inputs at the contemplated prices is an organisational problem which has not been tackled effectively.

Subsidisation need not be a permanent policy but the country is at a stage when subsidising of inputs could make an important contribution to speeding up agricultural development. In many areas more than one fourth of the population is in a state of poverty and the idle manpower resources of the community could certainly be made fuller use of in agriculture.

The need for increasing immediately agricultural production is so overwhelming that for the moment short-term measures must inevitably have a certain priority. The question of the supply of inputs is, therefore, of paramount importance.

In several cases whether it is tractors or insecticides or engines, the element of subsidy is more than counter-balanced by the sales tax or by the wholesale-retail price differential.

Agricultural production targets cannot be achieved unless the inputs are produced in sufficient quantities to meet fully the needs of agricultural production plans. Agricultural planning should include a plan for the production of inputs needed.

All personnel concerned with agriculture from the farmer and the V. L. W. to the Director of Agriculture in a state should be properly trained.

The technique of using improved implements is not passed on to the farmer along with the implements. It is not uncommon for improved implements lie idle in farmers' houses due to a lack of the knowledge of using them. Similar is the case with fertilisers. Spreading the knowledge of the technique of applying the fertiliser is as important as its distribution.

Irrigation is not an exception. Forty per cent of the irrigation is wasted. Farmers should be educated in the proper use of water as of inputs. The development of irrigation is important. In the short-run the emphasis should be on minor irrigation.

Subsidies should be eliminated as far as possible. Subsidies lead to number of accounting difficulties.

Price Policy

There has been no satisfactory price policy in regard to agricultural produce. Because of controls the farmer is deprived of remunerative prices for his produce. Increased production often means loss to the farmer because of price controls.

The price is fixed not on the basis of the farmers' cost of production but on the consumers' ability to pay which is very low. A suitable price policy should be framed and the production of foodgrains made worthwhile.

The price that is fixed should meet the cost of production of the farmers. The prices should be fixed in such a way that his productivity increases and his income also increases. The farmer should be guaranteed his cost of production and little margin over and above that as an incentive.

Floor prices should be fixed for as many commodities as possible and this should be part of the national price policy.

There should be parity between the prices of foodgrains and cash crops so that where climatic conditions are highly suitable for foodgrains there is no inducement to the farmer to substitute cash crops for foodgrains.

Cooperation

The credit cooperative societies should be linked with marketing cooperatives. Cooperatives should be the agencies for

selling diesel engines, improved implements, fertilizers and other inputs. The procurement of foodgrains can be done through cooperative marketing societies.

Cooperatives have done well in some States and people are eager to join cooperative societies. Marketing and processing cooperatives should also be encouraged.

Under the crop plan system every farmer has to be brought under the fold of cooperatives and also made to plan his crops. Inputs needed for the crop plan adopted should be provided in kind to the farmer.

Under the crop plan system loans are given on the basis of the crop that will be grown and recovered from the crop. The rationing of *credit* is intended to strengthen cooperatives and to distribute resources most rationally.

In the matter of credit it is desirable to draw a programme to supplement cooperative credit, without hampering the cooperatives.

Other Points

Progressive farmers are getting more assistance because they have the wherewithal to obtain loans and other inputs, whereas the small farmers who form 60 to 70 per cent of the farming community are not able to obtain adequate assistance for their needs.

There are no regulated markets and the farmer has to pay very high service charges in unregulated markets. Wholesale trade must be controlled by statutory bodies like the Food Corporation of India.

AGRICULTURAL POLICY UNDER THE THREE PLANS

C. H. HANUMANTHA RAO

INTRODUCTION

The current pause in economic planning in India is traceable mainly to the failures on agricultural front. The severe drought in 1965-66 and 1966-67 has no doubt contributed a great deal to the present difficulties. But the shortfalls in agricultural output can be attributed, in a significant measure, to the human failures revealed in the planning process. This is evident from the fact that agricultural output was already stagnant in the first three years of the Third Plan which were by no means abnormal years. The experience in the last few years calls for a thorough review of the main assumptions underlying our agricultural planning and policies and the methods followed to achieve the goals. An attempt is made in this paper to review critically the agricultural policies of the Government of India under the three plans *i.e.*, from 1951 to the present period.

Agricultural policies can be understood and evaluated only with reference to the overall strategy of economic development and the basic policies pursued to achieve the goals set for the country. This in turn involves an understanding and appreciation of the existing social structure and the political framework which are given as basic data and within which all economic programmes have to be drawn up and implemented.

The basic objectives as well as the processes of economic planning in India can be summed up as follows: A rapid rate of economic growth through democratic means with increasing emphasis on the welfare for the masses of people. These three objectives have become historical imperatives or inevitables for India. There is no alternative to the rapid rate of economic growth

for a country faced with widespread poverty, a population explosion and rising expectations. This necessarily involves the active participation of the state, which alone can combine social perspective or vision with required resources and discipline for undertaking those economic activities which are beyond the means of private individuals as well as for directing the economy as a whole. That all this has to be achieved through peaceful means is dictated by the prevailing social structure in India characterised by the co-existence of highly stratified and non-polarized class and caste groups and interests which considerably overlap each other. Given this social structure and the awakening and the drive of different groups to pursue their interests, the difference in the political set-up *i.e.*, whether it is some form of democracy or dictatorship makes only a difference of degree and not of kind so far as the means of achieving economic development are concerned. The third objective *viz.*, the welfare of the masses follows inevitably from the second but needs to be spelt out explicitly. The objective in this regard as incorporated in the Indian plans is the gradual reduction in the inequalities in incomes between different groups as well as regions. But what is crucial to this process of growth is not whether the degree of inequality actually decreases over time but that there should be a sustained and reasonable increase in the standards of living of the poor—which cannot be postponed in a poverty-ridden and awakened society and which can be achieved despite increasing inequalities in incomes.

Obviously, this model is a *via-media* between the two extremes: a very high rate of growth with comprehensive planning under a relatively monolithic and authoritarian framework on the one hand and the *laissez-faire* on the other, which is chaotic, slow-moving; and, therefore, vulnerable to violent upheavals. The rest of this paper examines whether, and how far, our agricultural policies fitted into this framework. For a proper understanding and evaluation of agricultural policies it is essential to know the social composition and the ideological predilections of the policy-makers. This is attempted in the following section. We have had a bunch of policies, successful as well as unsuccessful and those

potentially useful but adopted with a considerable lag. Many of them did not fit into the basic objectives stated above nor were they always in harmony with each other. Yet, many of the achievements and failures on the agricultural front may have had very little to do with the agricultural policies of the Government. It is, therefore, important to get a rough idea as to the magnitude of agricultural performance which is autonomous in the above sense, for this would give a more realistic picture of the contribution of conscious policies to agricultural development. An attempt is made, therefore, to assess the contribution of such autonomous forces in the next section. Agricultural policies are then evaluated grouping them broadly into two, *viz.*, successful or productive and those which failed. Policy problems concerning the future which are still shrouded in darkness and uncertainty but which may deserve the highest attention of planners and policy makers are discussed in the end.

POLICY MAKERS : WHO'S WHO ?

In theory, the policies formulated by a government constituted through the popular vote reflect the consensus of the community as a whole. This may be true in practice too, especially of those policies towards which public opinion is particularly sensitive. However, in the framing of policies which embody innovations and experiments such as those in the field of economic development, the understanding and persuasion of the leadership may be more important than the immediate, popular consensus behind such policies. Moreover, in regard to policies affecting particular economic sectors, a consensus among the policy-makers and the legislators does not necessarily imply a favourable response from the sectors concerned. Therefore, for a proper understanding of the policies for agricultural development it is necessary to know the background and preconceptions of those who are actively engaged in policy-making.

The three architects of economic policy-making in India in the descending order of their role are the politician, the civil servant and the expert—mainly the economist. Ever since Independence

there has been a noticeable cleavage between the political leadership at the centre and state levels regarding their approach towards agriculture. The Central leadership has been strongly urban-oriented in its background but had definite views about the strategy for agriculture which the leadership had been contemplating and working out even long before Independence. Their attitude towards agriculture has essentially been one of drastic reform and reconstruction on the basis of several schemes initiated from above. The hold of national leadership over the peasant masses and the intelligentsia was so strong that the opposition to their scheme within the ruling party was not effective even when many of these schemes could not be implemented and virtually remained on paper. This prevented a proper flow of genuine information from below to the top leadership which is essential for the formulation and implementation of realistic programmes. This is especially serious because the number of intermediaries involved between the cultivator and the highest policy-makers is much larger than in any other economic sector. Although the rural vote is predominant in the country, the proportion of members with a rural background was much less in the First than in the Second and the Third Parliaments. The weight of rural members has been increasing steadily in successive parliaments since the Second.

The leadership at the state level, on the other hand, has been composed of rich landed sections from the very beginning, whose hold on state affairs continued to increase over this period. Unlike the zamindars and the jagirdars they were rooted in the villages and displayed considerable drive for progressive cultivation. They had considerable influence over the peasantry and constituted the local base for the central leadership before Independence. However, they neither had the courage nor felt the need to openly oppose central leadership on several schemes of agrarian reform and reconstruction. They in fact passed legislation in favour of some of these measures but saw to it that it became infructuous in actual implementation. Agriculture being a state subject they have been in a position to undermine, if not reject, schemes which went against their interests and mobilise the state power and resources to subserve their interests.

The civil servant provided a continuity of policy administration between pre-independence and post-independence periods. The civil servant's impact on agricultural policy reflects his attitude towards the peasant or the trader as a reformer and the disciplinarian, on the one hand, and the benefactor or saviour, on the other. These attitudes were inherited from his role in the pre-independence period. He has tended to regard the Indian cultivator as basically irrational *i.e.*, ignorant of, and, therefore, very often acting against, his own best interests. The farmer is regarded as, by and large, allergic to change even when it benefits him. Also, all too often he suspects the farmer and the trader of anti-social and anti-government behaviour. In his role as the saviour and benefactor he finds it prudent to make basic decisions himself for the farmer and uplift the latter through ingenious schemes floated and administered from above with necessary financial support.

These attitudes as well as the expertise of the civil servant no doubt facilitated the undertaking and execution of a number of worthwhile reform measures as well as constructive projects for agriculture. But these attitudes may also mean the adoption of policies which reflect an insufficient appreciation of the role of market mechanism, the absence of respect for the farmer and consequently the lack of confidence in the farmer's initiative and resourcefulness, and indifference towards the sterile effects of pampering the farmers through doles and subsidies from above. Moreover, rooted as the civil servant is in secure urban environments, the distance between him and the farmer is very great and rarely has he any opportunity for a genuine comprehension of the requirements and urges of the farmers.

The progress of economic planning in India has been characterised by the increasing association of economists—Indian as well as foreign—with the processes of policy-making. These economists have, by and large, displayed a strong commitment to the objective of a rapid rate of growth of Indian economy. They have naturally been fascinated with the course and processes of economic development in countries showing a very high rate of growth in a relatively short period *e.g.*, Japan, Soviet Union

and China. They systematise with a considerable degree of sophistication the relationships between the key economic variables in these high-growth economies and sharpen their models as much as possible by ignoring the institutional and political framework within which such a high rate of growth was in fact achieved. These models—largely abstracted from institutional and political constraints—are then used to prescribe economic policies for the growth of developing countries like India. Many of these economists reveal an open aversion to the possible relevance of non-economic factors, the discussion of which is unexciting to them as this would mean the sacrifice of 'sophistication' and 'exactness'. As a consequence, the policy preferences for Indian agriculture revealed by these economists are invariably those which are appropriate to, and can only be implemented in, situations with an entirely different socio-political framework from that obtaining in India.

A typical growth-economist looks towards agriculture for finding surpluses for economic development. Agriculture thus interests him mainly as a source of cheap labour, marketable surplus—food, industrial raw materials and exports—and tax revenues. His accent is on *mobilizing* such resources for agriculture through appropriate institutional devices rather than on *generating* them through significant increases in agricultural productivity, as the latter would involve the diversion of scarce investable resources from the priority sectors. He, therefore, becomes pessimistic whenever the terms of trade turn in favour of agriculture and feels encouraged about growth prospects whenever these are turned against agriculture.* He seldom regards the agricultural sector as such as a major source of national income growth or of general welfare. Consequently, he evinces minimal interest in the problems of capital formation in agriculture or of its modernisation. Like the civil servant he views the peasant with suspicion whom he equates with the 'kulak' who should be made to behave himself. Such an attitude towards agriculture on the part of a typical academic economist should not be surprising in

* Favourable terms of trade for agriculture are indicated by the rise in the prices of agricultural commodities relative to those for manufactures.

view of his essentially urban middle-class background and exotic training in growth economics, which has tended to over-emphasise the technological and economic relationships to the relative neglect of the institutional setting within which economic growth is to be brought about.

This gap could perhaps have been bridged somewhat if sociologists had been actively associated with the planning processes. Social anthropologists in India have not made any serious and convincing attempt so far to identify the impact of the institutions like caste, joint-family, religion etc., on the preferences for, and the processes of, economic endeavour and to scrutinise the current policies for socio-economic development in the light of such knowledge. In particular, they rarely identify these social institutions and attitudes which may be congenial to economic growth and which can be exploited for this purpose. There is no doubt, however, that economic policies in India would gain in realism in the measure in which such insights are brought to bear on policy-making by the active association of growth-minded sociologists at the highest policy-making levels.

CONTRIBUTION OF AUTONOMOUS FACTORS

Land and labour (human as well as bullock) are the principal sources of output growth in traditional agriculture. Provision of irrigation water from wells and tanks by the use of human and bullock power and farm-yard manures also belong to this category. All these sources may broadly be categorised as autonomous in the sense that they are provided by the cultivators from the agricultural sector itself. On the demand side the growth of population is a major autonomous factor apart from urbanisation and rise in per capita incomes which may have been induced essentially by the process of planned economic development. However, none of these factors can be treated as completely autonomous because policies concerning land reforms, prices and credit can affect the level and the intensity of use of traditional inputs as well as the demand for agricultural commodities. Public irrigation projects, fertilisers and the new technical knowledge may be regarded as induced factors on which the influence of public

policies is overwhelming. Land reform, credit, price and tax policies may also belong to this group, although, as argued later, some of these may have been induced by the autonomous factors. It is difficult to quantify precisely the contribution of each of these categories of factors to the growth of agricultural output. However, it is possible to make an assessment in general terms especially regarding the changing significance of these two groups of factors over the plan period.

The two major factors accounting for spontaneity in agricultural performance in the post-independence period are the growth of population and the rise of agricultural classes to political power. Population growth has meant an ever increasing agricultural labour force which contributed to a better exploitation of traditional techniques of farming. Culturable waste lands held by the government were distributed to the Harijans and other landless labourers in many parts of the country. In many areas people on their own encroached upon waste lands for cultivation. Lands hitherto left fallow and uncultivated by large land owners were brought under plough in the wake of increasing demand for agricultural commodities. Among land-holding classes, the increase of family labour led to the sub-division of holdings and to the intensive cultivation of their land through the greater use of labour for irrigation and better crop pattern etc.

Political Independence released the initiative of agricultural classes, especially the richer ones, who came to wield considerable political influence and power at the district and state levels. This meant an increasing use of state machinery and resources for agricultural betterment. This is reflected, among other things, in the significant expansion of credit facilities for agriculture in the post-independence period. In this sense, some of the government policies and measures cease to be wholly exogenous to the agricultural sector, as they would have been carried through under the local pressure even in the absence of a concerted plan of development. The impact of these spontaneous forces extends much further. As argued later, although the influence of these forces on the basic policy-making was not significant in the initial stages of planning, their impact continued to increase and was

decisive in the adoption of the new strategy of agricultural development towards the end of Third Plan.

It is significant to note that the recent stagnation in agricultural output has been associated with the diminishing significance of direct contribution from the autonomous sources. Between 1952-53 to 1957-58, agricultural production (all crops) grew at a linear rate of 3.9 per cent per annum; the rate of growth slowed down to 3.4 per cent during 1956-57 and 1961-62; it decelerated further in the Third Plan period giving a picture of stagnation. Thus we have broadly three phases of agricultural growth in the plan period: impressive performance followed by moderate growth and then stagnation. The rate of growth of area under cultivation, which is a major autonomous factor, followed the same pattern. In the first phase, the growth of area was 2.8 per cent per annum; 0.8 per cent in the second phase and virtual stagnation in the third phase. Thus the extension of cultivation to new areas was the predominant source of output growth in the first phase. Although the importance of area declined very much in the second phase, the contribution of another major autonomous factor *viz.*, growing agricultural work-force seems to have been very significant. This is evidenced by the fact that the growth of productivity per acre accelerated from 1 per cent in the first phase to 2.6 per cent per annum in the second phase, despite a negligible increase in proportion of area irrigated or the use of modern inputs such as fertilizers and improved seeds. The slow increase of productivity in the third phase indicates the output gains from the further application of labour inputs per acre became negligible.

This expansion of output through the fuller exploitation of traditional techniques of farming was very much induced and sustained by the growing demand for agricultural commodities. This was reflected in the generally favourable terms of trade that agriculture enjoyed throughout the plan period. This is obviously an exogenous factor so far as the agricultural sector is concerned and may be traceable ultimately to the policies and measure of overall economic growth resulting in the increased demand for agricultural commodities. However, this particular stimulus

to agricultural performance cannot be traced to any specific policy measure calculated to promote agricultural development.

It would thus appear that agricultural growth was significant so long as the autonomous factors were important and it stagnated with the exhaustion of these sources. It is in this later stage when agricultural policy came into its own as a major variable for increasing agricultural productivity through the provision of necessary modern inputs that the failures on the agricultural front became conspicuous.

AGRICULTURAL POLICY : AREAS OF ACHIEVEMENT

The most significant achievements of agricultural policy in the plan period are: (i) the abolition of intermediaries, *viz.*, jagirdari and zamindari system; (ii) the association of agricultural classes with the formulation and execution of development programmes at the local level under the scheme of democratic decentralisation; (iii) provision of irrigation through major and medium irrigation projects and of power for minor irrigation through rural electrifications; and (iv) the expansion of credit through co-operatives. The first two measures represent a major institutional reform effected in independent India and the other two constitute the core of infra-structure which are beyond the means of individual cultivators and which could be provided only through the active participation and direction of the government. It is interesting to note that a firm start in respect of all these measures was already made in the early years of the First Five Year Plan which were continued in the subsequent plans.

The policy of agrarian reform in India concerned with action on three fronts: (i) the abolition of intermediary tenures like zamindaris, jagirs and inams which covered more than 40 per cent of the area of the country; (ii) the security of tenure to tenants in ryotwari areas and the regulation of rents, and (iii) the imposition of ceiling on land holdings and the distribution of surplus lands to the landless and uneconomic holders. The policies in respect of the latter two failed, by and large, and are discussed in the next section. It is in respect of the first that success has been almost complete.

The abolition of these intermediary tenures brought more than 20 millions of tenants into direct relationship with the state. It was much more than an economic measure. Many of these zamindaris and jagirs had their own revenue administration and for all practical purposes functioned as states within the states. The cultivators were burdened with several feudal dues and had to live under repressive and outmoded administrations. Their abolition and the reform of revenue administration in these areas not only gave adequate incentives to the cultivators for progressive cultivation but released their initiative on the cultural and political plane as well. Many of these zamindars and jagirdars were allowed to resume lands for self-cultivation which no doubt led to the eviction of tenants to some extent but contributed to the active participation of erstwhile landlords in farming. Although, part of these resumed lands may have been under-utilised or left fallow, the abolition of this system brought considerable areas of cultivable wasteland under the management of the government which were distributed to the landless contributing to the increase in area under cultivation in the plan period.

Although the scheme of democratic decentralisation (Panchayati Raj) was extended throughout the country towards the beginning of the Third Plan, the basis for it was already laid down with the first general elections when the rising agricultural classes began to wield political power at the local level. Their influence continued to increase in the subsequent period and the Community Development administration was faced with the problems of coping with them. The scheme of democratic decentralisation ended this confusion and conflict by subordinating the C.D. administration to the rural leadership. The scheme no doubt brought the caste-based as well as political factions to the forefront and in general provided the means of satisfying the age-old hunger for power by the rural elite. While this sharing of power can not be equated with their participation in development programmes, the experience of the Community Development programme made it clear that it was difficult to secure people's participation in development without entrusting them with the responsibility for formulation and administration of the programmes. The prospects of development seemed

better with such an integration than with continued conflict between the C.D. officials and the political elite.

With the agriculturists assuming power, the transmission of technical knowledge to the farms from the urban-based experts became relatively quick and the supply lines for inputs became more elastic. The major bottlenecks now lay in the quality of knowledge transmitted and the quantities of inputs supplied, both of which depended on the overall strategy of agricultural development. A consequence of democratic decentralisation which has been amply demonstrated, though not conclusively proved, is the increasing share of benefits going to the few richer sections of cultivators. This can be rectified only through the improvement in the bargaining power of the lower classes, which can be expected in course of time with the spread of literacy and education and with increasing political awareness of the masses.

In regard to the provision of infrastructure, *e.g.*, irrigation and credit, the achievements are substantial, although they can not be equated with success considering the requirements of Indian agriculture. Total area irrigated in the country registered an increase of 36 per cent in the first 10 years of planning. Although the achievement in respect of major and medium irrigation sources fell considerably short of targets during the Third Plan period, the targets relating to minor irrigation were fully achieved. All this represented an increase of about 25 per cent in the irrigated area during the Third Plan period. The progress in minor irrigation reflects increasing mobilisation of local resources for long-term investments. This process has been very much facilitated by the public programmes of rural electrification. The number of towns and villages electrified represented a twelve-fold increase between 1951 and 1966. The extension of power in this period has been essentially to villages and small towns. There has thus been a recognisable improvement in the capital base of agriculture in per capital terms during 15 years of planning.

Since the area under cultivation has increased substantially during this period, the proportion of area irrigated increased only marginally from about 17 per cent at the beginning of the First

Plants about 20 per cent towards the close of the Third Plan. Since about half of this irrigated area is represented by minor irrigation sources which are essentially dependent on monsoons, it would follow that as much as 90 per cent of the cultivated area in the country continues to be vulnerable to vagaries of monsoons even after 15 years of planning. The situation may well be far more serious because one can not place total reliance on the statistics regarding the achievements in respect of minor irrigation owing to the reporting biases on the part of the farmers as well as the agencies implementing these programmes.

Short and medium term credit supplied to farmers through cooperative agencies registered an eleven-fold increase between 1950-51 and 1962-63. As a result, cooperatives accounted for about 23 per cent of credit supplied to farmers in 1961-62 as against only about 3 per cent a decade earlier. However, bulk of the credit is still supplied by the private sources, of whom professional money-lenders' share is predominant. Moreover, a significant portion of the credit from cooperatives is appropriated by the agricultural money-lenders whose advances to the farmers have increased very much during this period. Also, the position is far from satisfactory regarding the repayment of cooperative loans as well as the purposes for which these loans are used.

5. AGRICULTURAL POLICY: AREAS OF INCONSISTENCY AND FAILURE

The most serious deficiency in respect of agricultural performance has been the continued imbalance in the growth of this sector relative to the rest of economy. The First Five Year Plan was essentially directed towards rehabilitation and consolidation of the economy with a clear emphasis on agricultural programmes. The Second Five Year Plan actually marked the beginning of a serious and concerted drive for economic development and it is precisely in this period that agricultural policies betrayed a doctrinal approach revealing inconsistencies between the accepted goals and the concrete measures.

As argued earlier, the emphasis on certain basic and heavy industries is an imperative for a country like India. However, it was neither imperative nor desirable to follow the socialist countries in regard to the techniques of keeping agriculture and the rest of the economy in balance. In these countries, the accent has been on the *mobilisation* of agricultural surpluses through cooperatives and collectives and by taxing agriculture heavily or by turning the terms of trade against it. Unlike these countries, we were embarking upon the road for planned economic development with the much poorer agricultural base, rapidly growing population and a socio-political framework which ruled out concentration of decision-making and compulsion. Therefore, agricultural policies designed to *mobilise* surpluses rather than *generating* them through increased agricultural productivity were bound to meet with failure in India. Yet, our policies revealed distinct preference for institutional measures which were inconsistent with the basic unalterables of the Indian situation. They betrayed a lack of awareness for raising agricultural productivity through increased investment and technical progress.

Public outlays for agriculture were reduced from one-third of total outlays in the First Plan to 20 per cent and 23 per cent in the Second and Third Plans respectively. The pattern of these outlays also altered very much. Programmes designed to strengthen the capital base of agriculture, *e.g.*, irrigation projects and soil-conservation and other agricultural production programmes claimed as much as 90 per cent of agricultural outlays in the First Plan but their share was reduced to 60 per cent in the Second and Third Plans. The share of the rest of the programmes comprising mainly community development and cooperation on the other hand, increased correspondingly from 10 per cent in the First Plan to 40 per cent in the subsequent Plans. Outlays for agriculture are a poorer indicator of achievement in real terms than the comparable outlays, say, for constructing a steel mill. Because of a large number of intermediaries involved between the planners and the farmers, the current or revenue expenditure has been higher and, consequently, the productivity of outlays has been lower. Moreover, administrative bottlenecks and

uncertainties which are especially serious for agriculture, increased the time lag between the decision-making and the realisation of targets.

The planners were, however, confident that the institutional measures contemplated for agriculture would make good the gaps in public investments. These measures fell under two categories: land reforms, cooperative farming and heavier land taxation on the one hand, and the Community Development programme on the other. The experience of the socialist countries was the source of inspiration for the former category of measures and of the technologically developed West, particularly the United States, for the latter. As argued below, both the categories of measures failed because in the one case they were not in keeping with the basic socio-political framework of India and in the other case the measures were based on erroneous preconceptions about the psychology of the Indian peasant.

Apart from the erroneous political assumption that land reforms as contemplated in the plans could in fact be carried through in India, the planners operated with several faulty assumptions on the factual plane as well. The basic idea behind such measures was that it would be impossible to effect a major breakthrough in agriculture without (a) ensuring security of tenure and 'fair' rents to tenants; and (b) breaking-up the large holdings and distributing the surplus lands to the small farmers and the landless who could later be induced to pool their lands for cooperative farming.

But the subsequent investigations, especially the National Sample Survey (NSS) and the Census of 1961, revealed that the area held by the tenants did not exceed 20 to 25 per cent of total cultivated area in the country, so much so, tenurial 'disincentives', if any, could not be a major retarding factor. Many of the landlords leasing out land are not absenteees but cultivate a part of land themselves through hired labour and through intensifying modern inputs like fertilizers. Since the shortage of modern inputs limits their use beyond a point, landlords may find it more profitable to overcome managerial difficulties by leasing out their land to share-croppers at this point instead of

cultivating it through hired labour. In fact, the share-rent from tenanted land is found to correspond to the surplus from own cultivation after deducting costs including wages.

Thanks to the growth of population and the resulting subdivision of holdings, the area potentially available for redistribution after the imposition of ceilings was found to be negligible and the requirements of the uneconomic holdings and the landless too great to be capable of adjustment with any reasonable level of ceilings. Response for cooperative farming was negligible despite the several incentives provided for them in the Second Plan. Such of the societies as came into being were found to be non-genuine and were prompted either by the desire to evade ceiling legislation or to avail of the special privileges granted to them in the Plans. The measures to enhance land revenue failed because of wide-spread opposition. More recently, there has been a drive for the abolition of land revenue at least on certain smaller holdings.

But the basic mistake of the planners was not that they were persuaded of the 'necessity' of such measures. One can still justify such measures in the interests of equity. And a more equitable distribution of land need not retard growth, if the necessary organisational measures are undertaken. Their basic mistake lay in equating what they considered to be a necessity with political feasibility. Given the socio-political framework within which planners and policy-makers have to operate, there are naturally certain unalterable or relatively permanent elements in the situation. Therefore, the policy basket facing the planners should consist of measures which are *desirable as well as feasible or attainable*. The choice then exists between the attainable sets and it is here that cost-benefit consideration come into their own in the selection of efficient sets from among the feasible sets.

In regard to land reforms, the choice was made on the sole criterion of desirability to the exclusion of feasibility. The result was systematic and successful evasion of tenancy as well as ceiling legislation through several ingenious methods. The most distressing consequence of these measures was that the administrative machinery reconciled itself to living with schemes which,

it was sure, were not capable of implementation and which, at the same time, it could not alter. Politicians reconciled themselves to making promises and passing legislation which, they were sure, would be evaded in practice. All this meant not merely a waste of scarce resources but resulted in frustration that brought economic planning itself into disrepute.

The community development programme was conceived not merely as an extension agency for transmitting new knowledge and supplying the modern inputs to the farmers but also as an agency for the education and the mobilisation of rural people towards a movement for their socio-economic betterment. The latter objective was prominent in the initial stages of the programme and the impetus for this was provided by the impressive performance of refugee rehabilitation programmes around Delhi, which was obviously a special case involving people who were uprooted and were also known for their drive and hard work. Towards the close of the Second Plan it was realised that programmes for increasing agricultural productivity should claim as much as 80 per cent of resources of the community development movement. But this time almost the whole of rural area was covered by the community development agencies, without possessing, at the same time, either a knowledge of new techniques which the cultivators did not already know, or the requisite supplies of new inputs like fertilizers and pesticides.

The success of agricultural extension in the United States owed primarily to the new useful knowledge and inputs supplied to the farmers. The village level worker in India failed to impress the farmer not merely because he was too young, urban-oriented and inexperienced in farming but also because he was not backed by adequate knowledge of new and profitable techniques and the requisite supplies of inputs. There has no doubt been an upsurge in rural areas for opening schools and hospitals and for constructing roads. But all this is traceable to the rise of agricultural classes and many of these programmes would have been carried through even without the community development.

While formulating agricultural programmes of the Third

Plan, the failure of community development was attributed mainly to the lack of cooperation from the cultivators and the solution was sought in Panchayati Raj institutions which ensured the supremacy of the popularly elected rural elite over the erstwhile community development administration. Indeed, the planners placed principal reliance on these institutions to carry out an ambitious programme of agricultural development envisaged in the Third Plan. The targets of the Third Plan in regard to food as well as cash crops were only slightly less than what was achieved during the decade 1951-61. The outlay on agricultural programmes provided in the Third Plan represented an increase of 92 per cent over the comparable outlay in the Second Plan. Although the programme could not be called over-ambitious in view of the immediate and pressing requirements of the economy, it is evident that relative to the Second Plan, the responsibility and the burden on the part of the administration as well as cultivators were almost doubled.

The sudden increase of responsibility in the Third Plan was a consequence of the neglect of agriculture in the Second Plan. But it was not realised that belated action in the field of investments with a long gestation period can not be a substitute for the failure to space them adequately by underlying some of these projects earlier in the Second Plan. The stagnation in agricultural output in the first three years of the Third Plan despite heavy investments should not have surprised the planners, because the realisation of targets in regard to irrigation and fertilizers is not a simple and instantaneous function of investments made. The roots of agricultural stagnation in the Third Plan lay really in the neglect of agriculture in the Second Plan.

Agricultural stagnation in the Third Plan forced the planners and the policy-makers to seriously review the basic assumptions and methods underlying our agricultural policies. The rapidly growing population brought home the urgency of the problem and the increasing influence of agricultural classes on policy-making facilitated a more realistic approach towards agriculture. It is significant that the then Food Minister of Union Government*—

*Shri C. Subramaniam.

the author of the new strategy of agricultural development based on high-yielding varieties and new scientific technology—belongs to a progressive farm-family of a leading agricultural State. As a result of this re-thinking the emphasis has been shifting from the institutional reform of agriculture to the lifting of its technical base through the application of modern science. There is a growing confidence among the planners regarding the psychological preparedness of the Indian cultivator for modernising this vocation and an increasing realisation that he should be given full initiative in this process leaving to the public sphere the provision of basic infra-structure including the new knowledge through research and experimentation.

AGRICULTURAL POLICY: ARE OF UNCERTAINTY

While the new strategy of agricultural development based on high-yielding varieties has caught the imagination of the planners and policy-makers, there is, as yet, no consensus on certain key issues of agricultural policy for the future. What follows is an attempt to raise some of these questions and to indicate the line of action suggested by the experience of agricultural planning and performance in the past.

Consolidation and Strengthening of the New Strategy

The new strategy has no doubt raised hopes of a major agricultural breakthrough but it has not yet been firmly established. The uncertainty regarding the new strategy consists not so much in the bottlenecks concerning the supplies of vital inputs like fertilizers as in the present state of ignorance concerning the whole complementary field e.g., pests and diseases, consequences for soil-structure, etc. Owing to the pressing requirements of food, the natural tendency is to concentrate on these aspects which yield quick and substantial results to the relative neglect of aspects which require more effort and time but may nevertheless, be crucial for sustaining the growth. The new strategy to be effective requires a massive effort in research and extension concerning soil-testing, evolution of proper crop-rotations, and the identification

of new diseases for finding remedies, etc. In view of the soil and climatic specifications, the effort will have to be highly decentralised and diffused. The success of the new strategy depends on the extent to which these vital aspects are identified and the technical know-how strengthened and disseminated through the required investments and organisation.

Provision against the Uncertainties of New Strategy

The new strategy has strengthened the belief that substantial increases in output can be achieved with the limited water resources available through their intensive use in restricted areas. Therefore, the emphasis may shift from the creation of new irrigation potential to the provision of current inputs. It is still an open question whether the available water resources would be enough for achieving self-sufficiency on the agricultural front with the help of new strategy. In view of the tropical and sub-tropical character of Indian agriculture and the fact that as much as 90 per cent of cultivated area is directly or indirectly dependent upon monsoons which are highly erratic in India, the answer to this question is most likely to be in the negative. Notwithstanding the answer to this question, the problem still remains whether it would be prudent not to provide against the uncertainties of the new strategy especially in the short-run. Tapping ground-water resources through quick-maturing irrigation projects provides a major buffer against such uncertainties, especially because the cultivators are familiar with the traditional techniques of irrigated farming. Therefore, minor irrigation schemes especially through rural electrification should continue to receive a high priority at least in the next decade.

Centre's Responsibility for Projects with a Long Gestation Period

With the progress of the new strategy the problem of soil-conservation may assume increasing significance owing to the intensive use of land with imperfect technical knowledge about the soilstructure. Soil-conservation requires large investments, the results of which are not immediately visible. Major and medium

irrigation projects and drainage schemes also belong to this category. The undertaking and execution of these projects require imagination, sizable effort and the preparedness to wait for the results of such a massive effort. All these have been a casualty with the state governments, who have been under continuous political pressure for multifarious schemes whose results are immediately visible. In fact, the serious shortfalls in respect of major and medium irrigation projects are attributable to such tendencies at the state level. Although agriculture is a state subject under the Constitution, past experience strongly suggests that such long-term projects should be undertaken and executed by the Central Government. This may call for the necessary adjustments—legal as well as financial—between the centre and states.

Incentive Prices, Storage and Distribution

The recent stagnation in agricultural output and the sharp rise in prices have brought to forefront the problems concerning price and distribution policies. The situation called for a substantial procurement drive for food grains especially in surplus regions at prices lower than the abnormally high free-market prices and their equitable distribution among the deficit regions. This required not so much the expertise to clear the areas of ignorance and confusion in respect of policy as the willingness and capacity on the part of state and central governments to procure enough for the deficit regions. The performance in this respect has not been encouraging in the years of acute shortages. Consequently, the management of imported stocks represented a major effort in the sphere of pricing and distribution. However, with a major breakthrough in agricultural growth and the spatial concentration of surpluses entailed by the new strategy, policies concerning procurement, storage and distribution would assume increasing significance. Agricultural price policy may assume popular dimensions in view of the growing need to support farm prices and the favourable response for such measures. The increasing concentration of surpluses in the limited pockets of the surplus

states may call for a carefully worked out and vigorous farm-price-support policy as the concentration of surpluses can depress the harvest prices even when the consumer-prices in other states are very high. The storage programmes—whether on public or private account—would have to become procurement-oriented and undertaken on a much larger scale than envisaged so far, because the storage requirements would be much larger with a spatial concentration of surpluses than when the surpluses are diffused and find their way into pipelines. Further, the intensive application of modern inputs in the monsoon-based irrigated regions may increase the fluctuations in agricultural output which reinforces the need for building up buffer-stocks.

Programmes of Rural Industrialisation for Mobilising Agricultural Surpluses

The new strategy favours the irrigated regions and the rich farmers, owing to the complementarity between irrigation and new inputs, on the one hand, and the increased investment requirements, on the other. Therefore, the agricultural revolution, if successful, may create the problem of finding productive outlets for the surpluses of the prosperous sections as well as of providing more remunerative employment for the depressed sections. Past experience suggests that the mobilisation of agricultural surpluses through heavier land taxation or by turning the terms of trade against agriculture, should be ruled out in a democratic framework. Alternative strategies may have to be adopted for the voluntary channeling of agricultural surpluses and entrepreneurial talents into productive pursuits. A bold and imaginative programme of rural industrialisation may offer a solution. The basic bottleneck for rural industrialisation is the lack of necessary infra-structure, *i.e.*, electrification, transport and communication facilities, banking institutions and training in skills. These are beyond the means of small entrepreneurs making a start in rural areas and will have to be planned much in advance and provided for by the government.

Efficiency of Agricultural Administration

The exhaustion of autonomous factors in agricultural growth and the modernisation of agriculture with the active participation of the government will inevitably increase the dependence of agricultural sector on industry as well as the government. Indeed, agriculture has never been so much dependent on the external organisations for its supplies as it is now. To weather uncertainty are now added the uncertainty of industrial performance and the uncertainty as to the policies and response of the administration. This may require a careful balancing of the relevant industrial targets in relation to agricultural requirements and the substitution of 'ad-hocism' in government policies by carefully worked out measures with a view to ensuring greater durability of public policies. The increasing administrative responsibility for agriculture may call for a proper division of labour through greater reliance on the market-mechanism and the initiative of the farmer. This may involve the devolution of a greater part of the work concerning the production and distribution of inputs to the private sector. The administration can enhance its efficiency as well as the impact of its policies on agricultural growth by confining itself to a limited number of crucial functions.

PROGRAMME ADMINISTRATION

B. SIVARAMAN

THE MAKING OF THE PROGRAMME

The systematic planning of agricultural development began only with the intensive cultivation programme of 1949. Since then in each of the three Five Year Plans a framework for the agricultural programme for the five year period has been worked out. The basic requirements of planning are an evaluation of what has already been done, an assessment of the needs and the marshalling of resources available including foreign exchange. Once the basic framework has been built up, the administrator will be in a position to work out the details of the administrative set-up to achieve the ends. In this exercise he will be helped by the evaluation of the previous programmes which brings into focus administrative failures as well as capabilities. Let us analyse the picture at the beginning of the Fourth Plan in regard to these basic requirements.

EVALUATION

A periodic evaluation is the only way in which the administrator will be able to know how far his methods have been successful and what new problems will have to be tackled for reaching the goal laid down in the programme. The Programme Evaluation Organisation of the Planning Commission carries out the basic works of evaluating various programmes of which agriculture is one. Various pilot studies are also carried out from time to time to check up particular aspects of the programme on a sampling basis. Both these checks proceed on the assumption made in outlining the programme and the yardsticks assumed for performance. Quantitatively the various targets are checked in the field for actual performance and

qualitatively the assumptions and the yardsticks are also test checked from time to time. The ultimate proof of the pudding is in the eating and all evaluations must take note of the production achieved in the various sectors of agriculture. A comparison between the product of the quantities of the various inputs made available for the programme and the yardsticks of production assumed for the inputs and the actual increased production brings out the weaknesses in the assumptions made and calls for a change in method and approach.

It has been found that whereas the yardsticks assumed in our calculations for various inputs like irrigation, soil conservation, improved seeds and fertilizers have worked fairly well during the First and Second Plan periods, they have not been accurate during the Third Plan period. This defect was noticed even before the analysis was made by the Planning Commission and has been taken note of in formulating proposals for the Fourth Plan. The yardsticks for individual inputs were not always cumulative in a package of inputs. Dr. David Hopper of the Rockefeller Institute who has made a study of the irrigation yardsticks has pointed out in an interesting paper the error in our assumptions. It was also found that two important aspects of agriculture, *viz.*, pest control and water management had not been included in our assumptions and the effect of other inputs may have been negated by pests and bad water control. Attempts have been made to correct these defects in the Fourth Plan formulations.

ASSESSMENT OF NEEDS

All planning proceeds on a basic analysis of what we want. We have been overwhelmed with our food problem all these years and this is apt to make us forget sometimes that the agricultural production programme is a much more comprehensive programme than merely assessing our food demand and trying to meet it. Agricultural production accounts for half our national income and as such plays a vital part in our national economy. The assessment of needs has to take note of the past performance and capabilities and balance between indigenous production, exports and imports.

RESOURCES

Administration is ultimately the art of utilising effectively the resources available for reaching the goals which the community desires. In agriculture, trained manpower, scientific research, effective extension work and marshalling of inputs are all important parts of the programme. For several of the inputs like fertilizers, pesticides, machinery and equipment, foreign exchange is necessary in large quantities until we are in a position to manufacture them in the country. Input planning will, therefore, be limited to availability of foreign exchange.

ADMINISTRATION

Agricultural production is determined ultimately by the total of the efforts of a vast number of individual farmers. The objective of agricultural administration should be to support the farmer through supplying his requirements and helping him to meet his difficulties. In our Constitution agriculture is both a central and a state subject in many parts of the field. The administrative set-up at the policy making level has to note of this diarchy and formulate the structure for mutual consultation and agreement on the basic policies.

The policy laid down has to be interpreted into administrative action by administrators at various levels in the broad divisions of manpower, scientific research, extension and inputs. There has to be organised inter-change of experience and information about problems between these broad divisions through a suitable organisation for coordination.

The machinery that is evolved has to take into consideration Panchayati Raj and its three-tier structure, since responsibility for rural development has been developed to a large extent on these institutions. We cannot afford to ignore this structure in any of our field programmes. One of the basic difficulties in pushing through scientific revolution in the agricultural sector is the unpreparedness of the administrative wing of Panchayati Raj to understand and carry out the programme.

The administration should build up a system of "progressing" and evaluation of the programme so that the policy making

organisations may be fed with facts quickly to enable them to take corrective action. The policy making organisations should be in a position to revise the programme periodically, take corrective action and modify the administrative structure to suit the problem.

These are broadly the problems involved in the making of the programme and organising the administration for its implementation.

THE NEW PROGRAMME

Though increased agricultural production is the generally accepted end, how big an increase and in what commodities are still matters of differing judgment. The overall limitations are the resources we can earmark for the programme, the technical know-how and the available personnel and the great unknown, the response of the agriculturists. We shall not go into the appraisal of the nature of past agricultural programmes for this discussion, but proceed from the Fourth Plan formulations as accepted recently by the Government of India. The programme is in two parts. The *Special Intensive Programme* concentrates on 32.5 million acres (gross) by 1970-71 where irrigation is assured for the crops or the recorded rainfall pattern of the area ensured the success of the crop. In the area, which is being selected in all the States, particularly in the IADP and IAA districts, a package approach of growing food crops by ensuring seeds responsive to a high dosage of fertilizers, supplying fertilizers in sufficient quantity and organising pest and disease control wherever necessary and as a preventive measure, is being spelt out as a National Programme. A similar Special Intensive Programme for cash crops like jute, cotton and groundnut is being organised on 12 million acres (gross) by 1970-71. The second part of the programme is the *Crop Intensification Programme* which is a deliberate adjustment of the cropping pattern in areas with irrigation or a reasonably long period of rainfall to give two substantial crops where only one crop used to grow before. These two programmes are expected to achieve substantially the increase in production of food grains and other crops

targeted for in the new Fourth Plan proposals. It is this programme, therefore, that needs the planned administration to back it.

EXTENSION

The Special Intensive Programme makes new demands on the extension organisation. These are :

- (a) A vast extension of the facilities for soil analysis so that all farmers in intensive areas are served, is necessary. In all soils there is a basic nutrient level, which varies substantially between poor and rich soils and the dosage of fertilisers has to be related to the nutrient level of the soil on the basis of soil analysis from the point of view both of productivity and economy.
- (b) Effective and quick pest and disease control measures are needed under the new and intensive programme of cultivation. The use of new seeds and the heavy application of fertilisers increase the hazards from pests and diseases. A luxuriant crop attracts and good soil fertility develops more pests and diseases. These must be controlled by the prompt diagnosis and the application of the appropriate pesticides, fungicides, etc.
- (c) The investment in inputs is heavy in the new agriculture and a bad or unsuccessful demonstration can result in serious loss to the farmer and discourage him from adopting new methods of cultivation. The standard of demonstrations must be greatly improved. The general level of demonstrations has not been satisfactory hitherto.
- (d) The introduction of new high yielding varieties on a vast acreage necessitates a sound seed production programme. The improved seed programme at present is far from satisfactory. Whereas admixture of varieties in the seeds in distribution may affect production only marginally at present, the lack of *purity in the new high yielding variety* may push down yields substantially and upset the entire programme.
- (e) The high level of inputs requires heavy investment.

Even in the existing programmes credit has been a crucial factor in the success of the programme. This is much more so in the new programme. Programme administration has to make the requisite inputs available to the cultivator in time.

The second part of the new strategy, viz., intensive or multiple cropping of areas which have irrigation facilities and assured rainfall, makes new demands on programme administration. These can be analysed as follows:

- (a) The use of the available irrigation facilities to the greatest advantage requires the reduction of the period of major crops without seriously affecting the yield and fitting in a second crop to suit the season. This could be done by the *introduction of new varieties of existing crops* for the different zones under the programme.
- (b) Taking the maximum out-turn out of the rainfall in the area may require a change in the pattern of cropping itself to get a full return out of even a deficit rainfall. It is observed that cropping follows the dietary habits of the people of the area rather than at securing an economic return or the maximum return that could be obtained from the environment.
- (c) To carry the message of (a) and (b) above to the people, an effective demonstration programme helped by an active applied research programme appears to be an important requirement.
- (d) There is a good deal of wastage of water in the present pattern of irrigation which is generally protective irrigation. Intensive cropping will impose too much of a strain on the system unless supported by methods of the economic use of water for a crop. This is a new science for the country.
- (e) New crops and new varieties of crops may lead to new pests and new diseases of crops. An active pest control organisation is a 'must'.
- (f) An intensive programme requires a rush routine for cultivation operations. The time factor for agricultural

operations becomes important. Existing facilities and methods of cultivation will be dilatory and make the programme risky. The organisation of operations in a proper sequence is a natural corollary.

In brief, the new strategy requires support for the following programmes:

- (a) Soil analysis and advice on fertiliser application.
- (b) Economic water utilisation and advice on the same.
- (c) New seeds with high purity level.
- (d) Effective demonstrations based on a high level of scientific and technical competence.
- (e) Prompt and effective pest and disease control.
- (f) Mechanisation of agricultural operations.
- (g) Provision of short-term credit for seasonal inputs like fertilisers and pesticides and medium and long-term credit for machines.

SCIENTIFIC RESEARCH

The changed approach to the agricultural production programme brings to the fore two areas of science where we have been found wanting. Fundamental research in evolving new types of seeds so far has been concerned largely with selection from existing native stock. Till recently the powerful instruments of planned breeding have been used very modestly and only to a limited purpose. The programme of increasing yields by use of seeds responsive to high levels of fertiliser application is based to a large extent on exotic plant types. A rapid acclimatisation of the exotic plant types to suit local conditions without their losing the characteristics which account for their yields is a challenge to scientists. The scientist is responding magnificently to this problem. The rapid transfer of new findings to the field is a challenge in demonstration that we have to face.

The other area of haziness is the problem of agricultural economics, the area of maximisation of economic yield per acre of land. The plant breeder so far has concentrated his attention on evolving a plant type which gives a maximum yield.

irrespective of the time factor involved in the cultivation. An intensive cultivation programme requires more careful use of the time and fitting in of several crops for the maximum exploitation of the land. The breeder is responding to the new challenge. His findings have to be translated into seeds and distribution of seeds quickly along with the knowledge of the requirements of their cultivation.

The new strategy as spelt out above requires the massive and close support of science and technology. It requires a level of services not so far contemplated in our agricultural programme. We shall examine in more detail later in this article the constraint of availability. Before we come to the problem, it is necessary to spell out in some detail what exactly the new approach means in men, capacity and services *vis-a-vis* the existing programmes of intensive cultivation. In the following paragraphs we shall try to analyse in detail the requirements of the new strategy in the important inputs and the services.

SOIL ANALYSIS

In the IADP programme soil analysis has been introduced as a part of the advisory programme. A broad specification of the types of soils in the district has been drawn up and general recommendations for each type of soil prepared. The extension worker has been using this chart generally in advising cultivators. Pilot schemes carried out in selected villages have shown that soil analysis of individual fields of the cultivators with recommendations of the appropriate fertilizer application based on the analysis has increased returns by 25 per cent to 30 per cent for the same level of expenditure. With a high level of fertilizer application soil analysis of individual fields and recommendation of balanced nutrient requirements for the crop will undoubtedly save both fertilizer and money. Wherever the Special Intensive Programme is introduced, soil analysis of individual fields becomes a necessity. Further, when intensive multi-cropping is attempted, the residual effect of high dosage of fertilizer for a good crop is important in saving unnecessary fertilizer application and to some extent also to decide on the

crop to follow. A good cultivator may require more than one analysis of his soil during a cultivation year. In an I.A.D.P. district the existing facility for soil analysis is adequate to deal only with 30,000 to 40,000 samples a year. The intensive cultivation programme over 10 lakh acres in a district like West Godavari will require analysis of about 10 lakhs of samples a year. The present method of analysis is to take samples through extension workers and do the work free of charge. The method is dilatory. Cultivators are now realising the utility of prompt advice on soils and are prepared to pay Rs. 2 or Rs. 3 per sample towards the cost of an efficient service. There is a growing need for custom service because of the intensive programme. Recently a group of cultivators in the West Godavari district and in the Krishna district have come up with a proposal that they may be allowed to import equipment for a soil analysis laboratory that will be run cooperatively on a cost basis. The administration has to provide for the new service in its planning and take advantage of the trend.

WATER USE

This again is a growing idea. The science is yet in its infancy in this country. Advice on individual crops can be built up but the main problem is area control of water use. In the present state of the irrigation service the individual often has no choice in his routine of water use or in the volume of water. Controlled water distribution has yet to be built up. The immediate problem, therefore, is to build up distribution so as to allow for control, at least, in small blocks of the command. Lift irrigation is a new weapon which can help in better planning of water for the crop. The immediate necessity is to organise water distribution in the areas where irrigation facilities have already been introduced. This is a part of irrigation planning and has to be done at the highest level by expert teams. Till area control is brought in the individual farmer can only plan within the limitations of the area. During the Fourth Plan the planning may not go below the area level. An advisory cell at the district level can now take care of the problem. The pressures of our

unmethodical irrigation facilities will be felt during the Fifth Plan period unless we take steps to improve the routines. For affecting such improvement advice to individual cultivators will become a necessity during the Fifth Plan.

SEEDS

The new seed programme comprises of high-yielding paddy and wheat strains and hybrid maize, jowar and bajra. The normal Extension Programmes of seed production through selected cultivators with technical help from the over-worked V.L.Ws. may not give the necessary purity of seeds. The small seed farm of the block also run by an Agricultural Overseer suffers from the similar disadvantage of insufficient technical support. A programme of double hybrids in maize and single hybrids in jowar and bajra and the use of male sterile lines hybridisation requires a high level of technical ability to control it. Seed certification for purity by experts has become a necessary part of the controls to ensure that only good seeds are disseminated. Large Seed Farms controlled by high level technical experts are necessary from the aspect of economy in cost and the production of a large quantities of seed under proper supervisions. The seed programme requires specialists at crucial points for its effective implementation.

PEST AND DISEASE CONTROL

The Special Intensive Programme and the Crop Intensification Programme are expected to raise new problems of pests and diseases which require expert advice promptly at the field level. The assistant extension officer with some orientation in pest control will find the problems beyond his understanding. The district expert will find the area of operation beyond his individual capacity to handle. A good pest control expert at levels below that of a district will be required to give prompt advice to the cultivator. Large-scale prophylactic controls raise problems of quick coverage of large areas with spraying and dusting with pesticides. The normal block equipment of hand sprayers and a few power sprayers will not be enough to tackle the problem.

MACHINERY

As intensive farming spreads over larger areas, the available manual and animal powers for agricultural operations in the villages get strained. A continuous cropping programme requires quick preparation of the land after a crop. A rapid spread of mechanical equipment is the answer. The District level expert of the IADP will find the scale of operations and maintenance much beyond his capacity. The block level staff are not experts in this field and cannot help in the programme. The need for maintenance facilities on a large scale and expert advice at field level on agricultural machinery pose problems of programme administration requiring new approaches.

DEMONSTRATIONS

The simple demonstrations of the ordinary programme were within the competence on a well-qualified V.L.W. The IADP requires greater competence on his part. The question of giving a special orientation to the V.L.W. to qualify him by an additional year's training better for agricultural extension was taken up. The higher degree of technical and scientific competence needed for the demonstration limits the field of demonstrations. Till the competence can be spread among a larger number of workers the problem is one of adjusting the programme and the location to the availability of workers and the centres of availability.

CREDIT

The approach to agricultural credit, so far, has been limited to the primary credit society of the cooperative movement. Supplies and marketing have remained very much of a problem and cooperative organisation has not been a satisfactory answer. The special IADP districts are to look into the overall requirements of short, medium and long-term credit of cultivators. Commercial banks, new agricultural credit organisations and the cooperative movement must all be involved in a massive programme, for meeting the cultivator's needs. The cooperative extension officer in the block helped by a Deputy Registrar of

Cooperative Societies at the district headquarters will be completely out of their depth in this new flood.

STREAMLINING THE ADMINISTRATION

It is necessary to recapitulate the salient features on the old approach to agricultural development to enable us to estimate the changes required to streamline the existing pattern of administration. The approach to intensive cultivation in the early stages of planning laid stress on the following:

- (a) the encouragement of the use of green manure, compost and fertilisers for better output;
- (b) the distribution of improved seeds so as to saturate the area with improved seeds;
- (c) Improving irrigation facilities as a protection against the vagaries of the season;
- (d) the introduction of soil conservation practices so as to conserve moisture and improve the utilisation of water; and
- (e) improved agronomic practices, like the Japanese method of paddy cultivation.

The National Extension Service took up the task of spreading this gospel in the field. The constituents were taken up as separate programmes and targets for performance were laid individually for each of these inputs by reference to yardstick. The field organisation of the N.E.S. was a part of the block personnel in the Community Development Blocks. Broadly it consisted of 10 V.L.Ws. in each Block with no agricultural extension officer as the head of the agricultural division. This organisation was controlled by the Block Development Officer who worked directly under the Panchayat Samiti. The District Agricultural Officer was responsible for giving technical guidance to the field staff. The Nalagarh Committee on Agricultural Administration had recommended that the District Agricultural Officer must be given the help of subject matter specialists, like an agronomist, entomologist, etc., to give the proper technical guidance to the field organisation. But no State was in a position to support the general programme with such specialists.

With the cooperation of the Ford Foundation an Intensive Agricultural District Programme was started in 9 districts of the country in 1961 and later expanded to cover 16 districts. In these districts the programme was placed under the control of a senior Agricultural Officer, called the Project Officer aided by some subject-matter specialists. The improvement they brought into the programme was to emphasise the package approach. This package approach was based on the full requirements of a good agricultural programme for the major crop of the area. A Farm Plan was prepared for each individual cultivator taking part in the programme and an attempt was made to guarantee the inputs for the programme. One important input emphasised in the programme was credit for the cultivator to invest in the inputs, like seeds, fertilizers, etc., for securing the maximum yield of the crop. The cooperative extension officer was an important part of the programme. The Farm Management Specialist was a new addition. He was to guide in the economics of cultivation and to teach the method of ensuring optimum returns. A soil-cum-fertilizer specialist was added to the specialists group to teach the utility of soil analysis and the correct dosage of fertilizer to be used. An engineer to help with machines and a water management specialist to teach the utility of correct water application were innovations.

The package approach spreading out to individual Farm Plans required more extension workers in the field and more specialists at the higher levels. The number of V.L.Ws. was increased to 20 per block and the number of A.E.Os. was expanded from one in the N.E.S. to 4-5 in the IADP blocks. Some of the A.E.Os. were generalists. An attempt was made to get some A.E.Os. with specialisation in plant protection, fertiliser application, etc. These were given some training to fit them into the posts of pest control specialists and fertiliser and compost A.E.O. The IADP was further supported from the Centre by a large staff of specialists, and extension officers. An attempt was made to spread the IADP message to a larger number of districts in the country through the IAA programme. Whereas the programme was maintained more or less at the same pitch

as for the IADP districts, the staff was diluted substantially. The IAA block had only 15 V.L.Ws. and 2 A.E.Os. The District Agricultural Officer was supported by 2 Specialists only, one for crop production and another for pest control. The central organisation for the IADP took charge of the IAA Programme also, thereby diluting the coverage of specialists for the field programme.

Programme Administration in agriculture has so far tended to follow the requirements of the production programme. The National Extension Service came into existence when the basic ideas of the new approach of proper inputs like good seed, fertilizer and green manure, along with the proper utilisation of the land had to be carried across to the whole nation. A thinly spread out extension organisation which could put across the simple principles in the field, was sufficient for the programme. V.L.Ws. with orientation in agriculture and agricultural extension officers chosen from the lower cadres of the agriculture department were able to get the message across on the whole satisfactorily.

As pressures developed for more production, the package approach was evolved by the IADP. The administrative set-up needed to operate the new programme is extensive as well as specialised. The extension organisation was strengthened to deal with the individual cultivator. Some specialists were introduced at the block and district levels. The block level specialists were still chosen from the same lower cadres of the Agricultural Department of the State, but an attempt was made to give them some subject-matter orientation, like pest control, compost and fertilizer use and seed processing and treatment. The district level specialists tried to introduce new ideas, like pest control, farm management and the use of machinery. These programmes were in an experimental stage. The district experts were fed by experts at the centre. Though the IADP experts could draw upon the state experts, their dependence was substantially on the central experts. The central experts formed a group by themselves and had no link up either with the main agriculture department or the ICAR which is a central organisation for controlling research and

disseminating research findings. As the pressures of the programme developed, it was found that much more intensive work in several fields and a stronger organisation at the district level were necessary to support the programme. The Ford Foundation has, therefore, offered that 5 out of the 16 IADP districts will be selected for the intensive work. The types of district organisation that will be necessary to strengthen the programme is being studied. A strong cell is being formed at the Centre to support the programme with subject-matter specialists. The basic field staff still continues to be the V.L.W. and the A.E.O. drawn from the lower cadres of the Agriculture Department. If the District level specialists are to attend to all the intricate problems of their speciality in the field, it may be found very soon that they will not be able to cover the district fully.

The new programme throws much greater burdens on the extension organisation. We have spelt out the requirements of the programme. High level technical guidance is necessary in the specialised fields of seed production, pest control, soil analysis and prescription of fertilizer application, water management, introduction of machinery and supporting the programme with a maintenance organisation. Credit of short, medium and long-term nature to enable the cultivator to get his inputs is an important need. Demonstrations have to be of a high standard. Can the basic extension service of V.L.Ws. and A.E.Os. meet the needs of the new situation ?

The present system of a generalist extension worker at the village and block levels with some orientation training in particular disciplines supported by subject matter specialists at the district level will not be able to manage the new programmes. In many of the disciplines, it is found that higher technical competence at levels lower than that of the district will be required. It also appears that a generalist with a little orientation in a specialised discipline will not be enough to tackle the technical and scientific problems that may arise in many areas. A subject-matter specialist at lower levels than a district is a need of the programme. Parallel problems have been tackled in other sciences. We can draw upon our experience

in medicine and health for a parallel. The general practitioner was for a long time sufficient to meet most of the people. The objective was cure. When preventive medicine came into the field, a parallel line of experts in preventive medicine called health authorities, were brought into the picture. As medical science improved, the general practitioner was given the support of specialists for blood, urine and similar specific examinations. With the advance of medical science specialised disciplines like heart, nervous system, ear, nose and throat, gynaecology and so on started having their own specialists at the field level supported by their own system of specialised examinations. In the agricultural sector, we are now trying to jump the second and third stage of health in one jump. Preventive measures in plant protection and disease control have to be spread rapidly over the entire agricultural sector. Specialised disciplines, like seeds, pest control, soil analysis, water control, machinery and credit have to be found in their field level organisations. It is sometimes argued that coordination at the village and block levels is important and this coordination can only be affected by training the V.L.W. and the agricultural extension organiser in the new disciplines and giving them overall charge of their areas. Here again, we can draw a parallel from the health services. The general practitioner has not been put out of business. He is still the first adviser, who, seeing the requirements of the situation, advises his patient to take to other specialised disciplines. The general practitioner supports the health authorities with information about preventive requirements and epidemic control. There is no reason to believe that a parallel system of organisation in the agricultural sector will not answer the requirements of the situation.

The research worker has to be closely involved in the field programme in order to reduce the period of transition from ordinary agriculture to agriculture based on science and technology. The scientist in this country has so far been working as an individualist. Rapid scientific advancement today is dependent on cooperative effort. The individualist has to merge his individuality in a programme for breakthroughs in

science. The Indian Council of Agricultural Research has taken up the responsibility for coordinated research in the country. When coordinated fundamental research throws up improvements there would be a need for a rapid translation of the findings to the field. Large-scale field application has to be worked out rapidly, firstly on a trial basis and later as a demonstration. Recently it has been accepted that all the research institutions in the country should involve themselves in the field in national trials of the facts established by research and national demonstrations of accepted findings. In this way science tries to approach from the top the field of operations in the field. A meeting ground has to be found between the generalist field worker at the block level and the top scientific administrators at the national level. One of the ideas proposed is to have a corporation for the promotion of fertilizer use which will later on take up pest control and soil analysis within its wings. This organisation will employ medium level field of specialists in their disciplines. This may be one way of bridging the gap. Another attempt is also being made to enable the research scientist in an institution to take up a large area for coverage. The IARI has accepted a programme of scientific demonstrations and advice in two districts of Uttar Pradesh, a district of the Punjab and the Delhi Administration. A parallel programme is being organised by the State of Madras through the Coimbatore Agricultural College and its sub-stations. This experiment may also throw up new methods of approach.

The administration of programmes in the field of agriculture as elsewhere has to take note of the limitations of organisation in its efforts to ensure the needed services for the new agriculture based on science and technology. So far the approach has been for the state to try and provide all the services needed by the cultivator through its extension organisation. As the area of operation extends and needs multiply, a greater degree of involvement of the individuals and local organisations becomes necessary. Normally, private enterprises meet the requirements of the farmer where a commercial approach is possible. In agriculture the question of services and supplies has so far always been linked up with subsidies. The subsidy

approach inhibits the healthy growth of private enterprise. Recently there has been a breakthrough in the thinking of cultivators. As long as the new programme provides an economic return to him on the basis of fair prices for his inputs the average cultivator is prepared to pay for services rendered to him. We have to make use of this new orientation in the thinking of the cultivator. Custom service will have to be built up. Programme Administration will have to plan gradually to get out of the field of detailed services and devote itself to the planning for services.

The requirements of personnel and their qualifications have been spelt out broadly in the above paragraphs. The field staff required includes a sizable number of specialists in addition to the generalists we have used so far. Ever larger numbers of these will be needed as the programme advances. The supervision of the programme also requires specialists in various disciplines in addition to the generalists. During the Third Plan, the basic preparation of experts in the field of pest control, soil analysis and so on has begun in our universities and colleges. The programme has to be stepped up. Field orientation of these experts and in-service training for selected specialists in the field is a demand of the new programme and has to be organised. Meanwhile the in-service training organised during the Third Five Year Plan for V.L.Ws. and A.E.Os. needs to be continued in order to bring into the field as quickly as possible the message of science and technology. These generalists have to absorb a new approach to their work. The involvement of the individual and the private sector of cooperatives and other agencies in the programme of servicing the agriculturist requires continuous and regular emphasis. The extension worker must be made aware of this need and has to learn the methods of achieving the objectives. The research worker has to get down to the field. The agricultural universities modelled on the pattern of the Land Grant Colleges of America have begun functioning. The pace has to be regulated to the needs of the situation. Many of these ideas are not new. In some form or other, we have taken note of the requirements of a scientific approach to

agriculture. What is now needed is a systematized approach towards a definite target.

We have now discussed the needs of the new programme. The administration of this programme requires the mobilisation of experts in various lines of agricultural development and the coordination of their work. It requires the close coordination of the research and the extension wings of the Agricultural Service. It requires mobilisation of private enterprise to take a commanding part in the servicing programme. Certain targets of coverage will have to be achieved, if we are to grow in the country the agricultural produce necessary for our economy. We now come back to the beginning of this article. Have we the means to satisfy this end ? If today, we have not got the means, can we build them up year by year during the Fourth Plan to keep pace with the phased requirements of the economy ?

Summary of Discussions

A drastic change in the pattern of programme administration is necessary for the success of the special efforts we are making to increase agricultural productivity and to overcome the difficulties posed by Centre-State relations and administrative coordination at all levels from the state headquarters to the village. These problems can be solved through autonomous administration at the local level. A fundamental change of the kind needed can be effected only through the widest measure of field autonomy through the establishment of agricultural development corporations in the districts to attend to the requirements of a production programme. The Corporation should have the Production Officer as its chairman and a board of directors consisting of experienced people. All the supplies of inputs should be routed through it. It should attend to the supplies of inputs and credit through the cooperatives so that there is an integration of the supplies according to the production plan. The farmer can obtain all his requirements from the corporation. The corporation should also purchase from farmers their marketable surplus produce.

The corporations should ordinarily conduct its operations on business lines preparing a profit and loss account and a balance sheet like any business enterprise. Now that we have corporations for every conceivable type of activity there is no reason why a similar arrangement cannot be tried in the field of agricultural supplies. This will lend the necessary strength to our administration as well as impart flexibility to it.

With regard to the other areas where we are making a somewhat less intensive effort, it is necessary to see that the extension personnel keep abreast with the latest research. There should be a two-way flow of personnel from the field to the research institutions and *vice versa* so that the latest research is easily disseminated to extension workers and also field problems are posed to the researchers. It is imperative that the agricultural sector should get the kind of administrative organisation which industry has been able to get.

The difficulties inherent in the proposal to set up corporations are : (i) mere existence of a corporation does not ensure autonomy or flexibility in its operation, (ii) a corporation which is primarily developmental and promotional in character, but yet has to present a profit and loss account and is answerable to the Public Accounts Committee, is really a most difficult one to devise. Corporations which are crop-oriented rather than spatially oriented have better chances of success. We should be careful, however, in multiplying the number of corporations. It is true that corporations have certain advantages over departmental organisations. But a corporation has meaning only when it has real autonomy.

The cooperatives should be further encouraged to act as the second line of supply for inputs and extension. In this way public participation also can be enlisted. There is no need for administrative innovations like the suggested corporation and add confusion to the system.

The experience of the existing government corporations has not been too bright, especially if some one considers the social cost involved, the monopolistic privileges and the rigid rules and regulations under which they operate.

Number of difficulties will have to be found in the proposed corporations. There is the basic shortage of inputs which the corporation cannot overcome. Moreover, the success of the corporation will very much depend on the attitudes of the existing field agencies and other organisations connected with agricultural production, at least during the initial period. The Central Government should be equally concerned with implementation of the project along with the State Governments. It should create the necessary field organisation for the purpose which should be regionally based.

In the adoption of mechanization one should see that there are adequate servicing facilities and also the suitability of the farm implements for the area and crop in question. There should be proper licensing and the tractor trade should be properly regulated.

The problem of administrative coordination is very complex and this is particularly true in agriculture. The relieving aspect is that it is setting the focus and attention now and competent people are concerned with it. The main point is we have to really simplify and decentralize our administration. We have not quite succeeded in doing so and our objective should be clear. Panchayati Raj institutions, cooperatives, voluntary organisations, etc., are all created to decentralize administration and we should really work these bodies without any mental reservations so that decentralisation is genuine. If we do not have faith in our institutions we have created, then however laudable may be our purpose, they will not succeed. So we should try to improve the existing system of administration and the institutions we have, before thinking of substituting them.

There is need for coordination at all levels of the administrations. We must have democratic institutions, like the Panchayati Raj bodies, at the lower level and these institutions must also be involved within the larger framework of administration which touches the common man not only from the point of view of popular participation, but also from the point of view of efficiency. We must, therefore, strike a right kind of relationship between the governmental organizations at all levels and

the voluntary institutions like cooperatives, farmers' associations and so on. Only then we will be able to implement successfully our projects which are concerned with the basic development needs of the country.

When we talk about programme administration, we generally mean that there is proper programming and that we need to devise administrative machinery to run the programme. It is necessary to make an analysis of the process of formulation of agricultural programmes and its implementation machinery. We should link up the financial programme with the administrative programme. In addition to financial budgeting we should also undertake manpower and physical budgeting in terms of performance and make use of the existing system of administration.

Enough attention has not been paid to programme administration in an organisational sense, and that it is necessary both to state the objectives and also to work out a rigorous organisation which supports the programme and carries out the various tasks involved. It is necessary to spell out the system of organisations in terms of materials required, management needs, financial requirements and so on, and to draw up all these in a control sense to achieve results. There is need for a management information system with result or action orientation.

AGRICULTURAL EXTENSION

D. V. REDDY

The fundamental objective of agricultural extension is the fullest development of the farmer and his family and their well-being. Agricultural extension is essentially an educational process through which farmers are trained to help themselves and are inducted and guided in the best tillage practices and fullest utilisation of the advances made by science and technology. Agricultural production takes place in the fields of over sixty million farmers scattered all over the country. The majority of them are illiterate and follow traditional methods of farming. The yields of most crops are low and there has been hardly any progress through the ages. During the period covered by the first three Five Year Plans it has been possible to achieve a linear rate of growth of only about $2\frac{1}{2}$ per cent per annum. If the country is to become self-sufficient in foodgrains by the end of 1970-71 and to meet the requirements of food and fibres of a fast growing population, an annual rate of growth of the order of 8 per cent would be needed during the next few years. An increase of agricultural production of this magnitude is a stupendous task. A massive agricultural extension effort is needed to achieve a breakthrough.

There is no short-cut or easy way to the modernisation of a traditional agriculture. This is the experience of countries which have made significant progress in agriculture, *e.g.*, Japan, U.S.A., U.A.R., Mexico, Israel and Taiwan. The use of new techniques, fertilizers, green manuring, improved seed, plant protection measures, research, etc., individually does not add significantly to productivity. The recent experience of the Intensive Agricultural Programme has demonstrated that increase in production can be achieved only through the effective

combination of the various inputs backed by a strong extension effort.

Agricultural extension efforts have undoubtedly lagged behind the expectations of the Five Year Plans of development. The major impediments to effective extension have been:

- (1) Insufficient administrative coordination in the working of several departments concerned with agricultural production leading to dual control over the field extension agency.
- (2) Insufficient numbers of extension personnel resulting in an unmanageable area of operation and lack of contact with farmers.
- (3) Lack of technical competence and skill on the part of field workers.
- (4) Inability to back extension efforts with adequate and timely supply of inputs.
- (5) Absence of adequate motivation of both extension personnel and farmers.
- (6) Failure to make full use of the various techniques of individual and mass communication.
- (7) Time lag between research and extension.

These problems are examined and solutions suggested in this Paper.

ADMINISTRATIVE COORDINATION

The launching of the Community Development Programme in 1952 marked the beginning of an integrated approach to rural development. It recognises the inter-related character of economic and social aspects of village life and attempts to deal with all the facets of rural life in an integrated manner. Beginning modestly with 55 Projects in 1952 it now covers the entire country with 5,249 blocks.

The Community Development Block with a staff consisting of the Block Development Officer supported by Extension Officers in Agriculture, Cooperation, Animal Husbandry, etc., and 10 VLWs, has become the unit for planning and implementing

programmes of Development in agriculture and other fields of rural development. The planning of production and development programmes and their technical supervision in different fields are the responsibility of individual development departments, such as Agriculture, Community Development and Panchayati Raj, Cooperation, Irrigation, etc. The work of all these departments intimately concerns agriculture. For example, it is the responsibility of the Department of Cooperation to service agriculture with sufficient credit, supplies, and marketing facilities through cooperative institutions. Similarly, the Irrigation Department has to arrange for the timely supply of irrigation water which is the most important factor contributing to increased agricultural production.

The lack of proper coordination in the working of these departments at the state, regional and block levels has been one of the major problems retarding the growth of agriculture over the past decade. At the State level there is no organic link between the various development departments concerned with agricultural production and this is reflected all along the line down to the field level. Under the Panchayati Raj set-up the Block Development Officer is the chief executive of the Panchayat Samiti and works under its control. He controls the activities of the Extension Officers and the VLWs in the block. The Extension Officer, on the other hand, is on the field staff of the Agriculture Department and works under the technical and administrative control of the District Agricultural Officer. Though the main functions of the Agricultural Extension Officer relate to agricultural production, his control over the V.L.Ws. the principal agents of extension in the field, is not well defined. The administrative control over this key functionary is exercised by the Block Development Officer.

The Working Group on inter-departmental and institutional coordination of agricultural production (the Ram Subhag Singh Committee) reviewed the existing arrangements and suggested measures for bringing about coordination within the entire administrative and organisational structure from the village to the State level. It suggested the creation of an integrated

department to be designated the Department of Agriculture and Rural Development comprising of the departments of Agriculture including minor Irrigation, Animal Husbandry, Fisheries, Community Development and Panchayati Raj, Cooperation and allied departments. It recommended that the Secretary of the integrated department should function as Commissioner for Agricultural Production and Rural Development and coordinate the work of all the heads of departments concerned with agricultural production. It also recommended the establishment of Coordination Committee at different levels. At the block level, the dual control over the block agency was sought to be avoided by placing Extension Officers on the cadres of the respective technical departments but having his character roll initiated by the Block Development Officer and forwarded to the District Agricultural Officer and by placing the VLW under the administrative control of the Agricultural Extension Officer who would initiate his character roll. To secure effective control over the Block Development Officer which has hitherto been lacking, the Committee suggested that the District Agricultural Production Officer should write the confidential report of the Block Development Officer after consulting the District Officers of the other technical departments and should have the power to transfer the Block Development Officer within the district.

An upward revision of the present status, scales of pay, etc., of the Block Development Officer, *vis-a-vis* the District Agricultural Officer should be seriously considered. If the Block Development Officer is to play an effective role in the development of the block he should be sufficiently senior in status to be able to command the respect of the team of extension officers and to secure proper coordination between official and non-official agencies. It may be mentioned here that in view of these considerations the status of the Block Development Officer has already been raised in some States.

It also follows that if the District Agricultural Officer has to discharge his responsibilities properly, there should also be a corresponding rise in his status. He should, therefore, be a

Class I officer with adequate power to supervise and control the work of the Block Development Officers. Some of the States have already given a lead in this direction by raising the status of District Agricultural Officer to Class I.

The measures suggested by the Working Group to ensure proper administrative coordination between the various departments and agencies concerned with agricultural production and to create a single line of control over the block extension agency responsible for the implementation of the agricultural production programme in the field have been accepted by the States and some of them have given effect to the suggestions. This has resulted in a better coordination of the work of the VLWs, Assistant Extension Officers and Block Development Officer.

With the setting up of Panchayati Raj institutions non-officials have been brought into the field of agricultural development programmes at different levels. These bodies have been designed as the principal instruments for executing rural development programmes in different spheres and vested with wide powers. Proper coordination between these representative institutions and the existing official extension machinery becomes imperative. The technical departmental staff at the district level and the extension staff at the block level have assumed the role of technical advisers to the Zila Parishads and Panchayat Samitis respectively assisting them in making correct policy decisions in regard to the planning of agricultural programmes and the distribution of supplies, loans, etc. This is a difficult task and requires considerable tact and resourcefulness on the part of extension workers.

The VLW was conceived as a multi-purpose worker in the initial stages of the community development programme. At the same time it was also visualised that he should pay considerable attention to agricultural production. As the problem of food supply became more pressing it was felt that he should devote himself wholly to the implementation of agricultural production programmes. The Union Ministry of Community Development and Cooperation issued instructions to state

governments that the VLWs should devote themselves in future only to one set of tasks, namely, organising extension and supplies for agricultural production programmes and helping panchayats to draw up and execute, village agricultural production plans. Experience has, however, shown that state governments have not been able to implement this directive effectively.

The VLW still devotes a considerable part of his time to non-agricultural work like the collection of taxes, attending to social services, etc. It is necessary to release the VLW from all non-agricultural work, particularly in the context of the intensive agricultural programmes which have been undertaken on a large scale and now cover about a fifth of the total cultivated area in the country. These programmes demand the whole time attention of the VLW to enable him to establish contacts with farmers within his jurisdiction and ensure timely supplies of agricultural inputs. Alternative functionaries should be appointed at the village level to relieve the VLWs of their non-agricultural work. This conclusion is reinforced by experience for areas where Panchayats have provided a separate officer for non-agricultural work; the VLWs have shown better performance in agriculture.

NUMBERS OF EXTENSION PERSONNEL

One of the major lessons of the operation of the Intensive Agricultural Programme is that unless the VLWs and the Agricultural Extension Officers are put in charge of reasonably manageable areas, where it is possible for them to have close personal contact with every cultivating family, the implementation of agricultural production programmes is ineffective. The jurisdiction of a VLW is spread over an area of about 5,000 acres cultivated by nearly 1,200 farming families. As against this, in Japan, where the means of transport and communication are highly developed and the level of literacy of farmers is also much higher than in our country a Farm Extension Adviser has to deal with about 550 farming families cultivating only about half the area. In addition there is an equal number of qualified and well trained

Farm Advisers (Extension Workers) maintained by cooperative organisations. The workload of the VLW at present is too heavy for him to be effective in assisting farmers in the adoption of improved techniques of production. Similarly, the area of operation of the Extension Officer in the block is unmanageable. These shortcomings have been taken into account in planning the intensive agricultural programme (Package Programme) where the extension staff has been strengthened by the addition of 10 VLWs and 3 to 4 Assistant Extension Officers for each block. Individual farm planning and other activities of intensive agriculture over the entire area require large increase of the number of VLWs and Agricultural Extension Officers than is provided at present.

TECHNICAL COMPETENCE AND SKILL OF EXTENSION WORKERS

The effectiveness of the VLW and the Agricultural Extension Officer as extension agents depends largely on the extent to which they are able to convince farmers of the superiority of improved technology over traditional agricultural practices. If the job is to be accomplished extension personnel should be competent as well as qualified by training. The VLWs consist of mostly matriculates, though in some states there are non-matriculates. They have a training ranging from six months to two years. Though the main emphasis during the training course is on agriculture due to the large number of subjects that are taught and the inadequacy of facilities for practical training at Gram Sevak Training Centres, the VLWs are rarely well equipped to advise cultivators on field problems. This deficiency has come into sharp focus in the areas covered by the intensive agricultural development programmes where they have been called upon to render a higher level of technical guidance to farmers in the preparation and implementation of farm production plans. This aspect has been considered by several committees in the past and it has been suggested that all the VLWs should be gradually replaced by agricultural graduates over a period of time and that during the Fourth Five Year Plan VLWs should be

replaced by agricultural graduates at least in the intensive agricultural blocks and that during the Fifth Plan the process should be completed over the entire country.

This is an ideal that can be realised only slowly. It is not possible to find graduates in adequate numbers due to: (i) the limitation of the capacity of the existing agricultural colleges; and (ii) the ineligibility of many of the VLWs in service for admission to degree courses in universities.

In the circumstances the following course of action appears feasible for improving the educational qualifications of extension workers:

- (1) All future vacancies of VLWs should be filled from among graduates in agriculture.
- (2) The eligible VLWs should be deputed for a degree course in a phased manner.
- (3) A special diploma course may be introduced in selected agricultural colleges and Rural Institutes to train VLWs who are ineligible for a degree course.
- (4) Graduate VLWs should be eligible for promotion to higher posts including those of District Officers. Diploma holders should be eligible for higher jobs like those of Assistant Extension Officer on the technical side and Block Development Officer or other similar posts on the administrative side after they gain sufficient experience. The above will serve both to increase their competence and to provide them with the necessary incentive.
- (5) Assistant Officers at the block level and subject matter specialists at the district level should be enabled to acquire greater specialisation in their work to be able to help farmers who needed specialist guidance.

Training of Extension Workers

One of the major experiences of the intensive agricultural programmes has been that extension personnel need continuous "on the job training" oriented to the needs of specific programmes.

Such training will help to improve their skill and competence. For all categories of extension personnel at the field level, pre-entry, in-service and refresher training of an adequate standard should be provided as detailed below:

(1) *Pre-service Training*: The quality and content of the pre-service training imparted in both agricultural colleges and Gram Sevak Training Centres is not often up to the mark. It should be improved and trainees given a practical experience by allotting specific plots (either for each VLW or for a group of VLWs) and making them fully responsible for their cultivation and the returns. The trainees should be brought into touch with extension problems in the blocks attached to their institutions.

(2) *In-service Training*: A fresh graduate requires some experience in the field before he can take up independent charge and win the confidence of farmers. This experience can be gained only through adequate in-service training under experienced extension officers. Every new graduate or VLW posted to the field must be trained at least for a period of six months with a view to giving him the necessary self-confidence and familiarity with local agricultural problems which he has to tackle.

(3) *Refresher Training*: In view of the rapid growth of agricultural science and technology it is necessary to organise periodical refresher courses for different categories of extension personnel. The evolution of high yielding varieties of crops and the recent advances in plant protection and fertilizer technology, etc., and the constantly expanding frontiers of agricultural science and technology make periodical re-training a necessity.

Such training and orientation are necessary not only for agricultural field workers but also for technicians and administrators at higher levels. The Agricultural Personnel Committee has endorsed the recommendation for the establishment of a Central Staff College for imparting in-service training to senior officers of the Agricultural and Animal Husbandry Departments in the States. The suggestion deserves early implementation.

There is need also for the orientation of officers belonging to the administrative and other services involved in agricultural programmes. District Collectors should be given such orientation during their initial training in the National Academy of Administration. Officers of other departments like Co-operation, Community Development and Panchayati Raj, Irrigation, Finance, Audit, etc., should also be given orientation in agriculture.

Any amount of training and specialisation will be of no avail unless the officers entrusted with the responsibility for implementing agricultural production programmes develop a rural bias and missionary zeal for the promotion of the well-being of the village community and become better acquainted with village people and identify themselves with the latter. Officers should frequently tour villages, identify problems and attempt to solve them on the spot. Unless the field worker spends a considerable portion of his time in the area allotted to him, his contribution to agricultural production may not be significant. The regulations concerning minimum tour days and overnight halts in villages should be scrupulously enforced.

SUPPLY OF INPUTS

A break-through in agricultural production through the adoption of improved technology has been possible only in the areas where supplies of inputs have kept pace with the educational aspects of extension work, where the package of recommended practices and the package of service (including supplies) have gone hand in hand. The chief inputs which the farmer requires for increasing production are improved seeds, fertilizers, pesticides and improved implements. Programmes in these fields have exhibited certain weaknesses which affect extension work. These are briefly referred to below:

Improved Seeds

The latest report of the Programme Evaluation Organisation (PEO) on "Problems of Coordination of Agricultural

Programmes (1965)" has brought out the shortcomings of the seed programme at different stages of supply of breeders' stock to seed farms for production of foundation seed, certification, procurement, testing and storage. As a result even at the end of the Third Five Year Plan we are not in a position to assure an adequate supply of really good quality seeds. The evaluation report has recommended efficient organisation, coordinated arrangements and stricter enforcement of quality control for ensuring the success of seed programmes. In addition to the existing local varieties evolved by the States and multiplied by them, many high-yielding varieties in rice, wheat and hybrids of maize, jowar and bajra have come into the field which require special techniques for their production and distribution. The following arrangements are suggested:

- (1) For improved local varieties, foundation seed produced on the State seed farms should be multiplied through seed villages where close supervision and check at each stage by the extension agency is possible.
- (2) For high yielding varieties and hybrids the National Seeds Corporation should take responsibility for production as is done at present. Its efforts can be supplemented by the State Seed Corporations proposed to be set up in the States during the Fourth and Fifth Five Year Plans.
- (3) In addition Joint Stock companies may be encouraged under strict supervision by extension personnel to take up such programmes of seed production.

The adoption of the Seed Law which is on the anvil will be a major step towards the development of a sound seeds policy.

Fertilizers

The problems in the case of fertilizers are inadequate supplies, lack of distribution points and insufficient knowledge of the proper use of different types of fertilizers. As a result of extension efforts over the past several years the demand outstrips the total available supply including imports. The Fourth Five Year Plan envisages an increase in the use of fertilizers from

the present 1 million tons of nutrients in a year to 4.1 million tons by 1970-71. Although the Government is taking steps to increase indigenous production as well as imports, there is no escape from a position of continuing scarcity for some years to come. Measures have, therefore, to be devised to ensure the best use of the fertilizers available as suggested below:

- (1) Available fertilizers should be used mostly in areas which have given economic returns by their use as an immediate programme.
- (2) With the larger quantities of fertilizers that are likely to be available by 1970-71 greater attention needs to be paid to the fertilizer promotion programme. This can be done through widespread demonstrations on cultivators' fields. These demonstrations should, as far as possible, be of a composite type designed to show the benefits of fertilizers use in combination with other inputs.
- (3) Fertilizer manufacturers should organise active sales-promotion programmes for their products. In a programme of sales-promotion provision must be made for services to cultivators by way of expert advice, etc.
- (4) Cooperatives should play a more active role in fertilizer promotion and distribution. With the increase in the margin available to the Cooperatives on fertilizer distribution, Cooperatives should find it possible to set up a larger number of sale points in the interior so as to bring fertilizers within easy reach of farmers. Where Cooperatives are weak this work should be undertaken departmentally.
- (5) The idea of "selling the product with knowledge" should be popularised among fertilizer dealers and the Cooperatives. The experience of the U.S.A. and Japan shows that the dealer who attempts to sell cheap fertilizers without guidance on their use loses ground and is gradually forced out of business. This will require some training in fertilizer use. Every packet of fertilizer should carry a leaflet of instructions about its use.

- (6) The use of fertilizers should be based on the results of soil analysis. A specific fertilizer recommendation for a cultivator's field based on soil testing would be more convincing than the generalised recommendation for the area, as has been proved by demonstrations conducted in the IADP districts. Therefore, measures to make the soil testing service more efficient, extensive and easily available to the farmer should receive priority. A number of soil testing laboratories have been set up in the IADP districts and several more are to be established in intensive agricultural areas during the Fourth Five Year Plan period. There is also a proposal to provide a network of mobile soil testing units to supplement the service rendered by the soil testing laboratories. In addition, it is necessary to encourage the establishment of private or cooperative soil testing laboratories which could provide an efficient soil testing service on a custom and cost basis.

Pesticides

Plant protection activities need to be considerably stepped up during the Fourth Five Year Plan period. These assume greater urgency in the context of the intensive agricultural programmes and the new programme for the cultivation of high-yielding varieties. Intensified extension efforts to popularise plant protection measures on an area wide basis, training of extension staff in the identification of pests and plant diseases and the adoption of effective remedial measures, an adequate supply of sprayers and dusters for which increased demand has been generated in the country, arrangements for maintenance of plant protection equipment, including stocks of spare parts and increasing the supplies of pesticides in short supply should receive greater attention. The cultivator should be convinced of the benefits of prophylactic treatment through large scale demonstrations. It will hardly be possible for the State Governments or Central Plant Protection Units to cover the entire cultivated area during the cropping season and it is, therefore, necessary to

encourage custom of spraying and induce cultivators to undertake plant protection measures at their own cost.

Improved Implements

The introduction of improved implements has not received the attention that it deserves. Except in isolated areas there has so far been no large scale spread of improved implements which can play a significant role in increasing agricultural production. Mechanised cultivation is still in its infancy. Nearly sixty per cent of agricultural holdings in our country are less than five acres in extent and must depend largely on animal power. Mechanisation is possible over forty per cent of the cultivated area and should be undertaken. Research has to be intensified on identifying the suitable tillers/tractors for such holdings as also on bullock drawn implements to suit the requirements of small holdings.

Recent experiments conducted in the IADP areas have revealed that production can be increased by 10 to 20 per cent by merely placing fertilizers in bands along with the seed, using seed-cum-fertilizer drills. Similarly, threshers, chaff cutters, ridgers, improved ploughs, etc., have also proved their usefulness. Such implements should be popularised all over the country through well laid out demonstrations by special staff trained for such work. In addition arrangements should be made for their large scale manufacture, either in state workshops or by encouraging private manufacturers. Service and repair facilities should also be provided at convenient centres simultaneously with the popularisation of the new implements.

INCENTIVES

Extension efforts need to be supplemented by incentives to extension personnel and farmers.

Low scales of pay are a major handicap from which agricultural service personnel have suffered in the past. In most of the states as a result of the recommendations of the Agricultural Administration Committee, (Nalagarh), the pay scales of the

employees at different levels of the agricultural departments have been revised. In the case of some, the enhanced scales of pay are still not very attractive and do not compare with the pay scales of corresponding administrative, engineering, medical and other technical services. The agricultural service has not been able to attract its proper share of the best talent available in the country. The formation of the Indian Agricultural Service will no doubt act as a strong incentive and raise the morale and status of the agricultural services. For the categories of staff which will not be included in the Indian Agricultural Service such as the Block Development Officers, Agricultural Extension Officers, and VLWs, State governments should consider higher pay scales so as to bring them in line with the pay scales of the field staff of other technical departments and of the corresponding categories of staff of the Government of India. Other ways of rewarding good work are advance increments and opportunities for higher training and development which would improve the employees' promotion prospects. The Assistant Extension Officers and VLWs who have done good work should be deputed for post-graduate, graduate or diploma courses according to their eligibility.

The motivation of the farmer is important. It must be made worthwhile for him to adopt improved technology by the guarantee of support and remunerative price, and the implementation of land reform measures. It should not be unduly troublesome for a farmer to obtain an adequate and timely supply of the inputs that he needs. Price stabilisation measures have been a powerful stimulant to the growth of agricultural production in other countries particularly in Japan and the United States. The price support measures taken by the Government of India during the two years constitute a significant step forward. State governments, for their part, should expedite the implementation of land reform measures so as to complete them by the end of the current Plan. The procedures for the supply of inputs should similarly be made simpler for the farmer.

EXTENSION TECHNIQUES

The techniques adopted by extension workers to educate farmers in improved methods of cultivation may be summarised as follows :

- (1) Demonstrations.
- (2) Distribution of literature like leaflets, pamphlets, circular letters, newspapers, etc.
- (3) Visual aids like posters, photographs, flashboards, flannelgraphs, films, bulletin boards, slides, film strips, etc.
- (4) Direct contacts through tours, songs, dramas, puppet-shows, etc.
- (5) Working with village leaders.

Extension workers generally feel that demonstrations are the most potent instrument of extension education as "seeing is believing". Demonstrations are of several kinds. Results demonstrations involving one or two practices and composite demonstrations involving a "package of practices" have been the most common. Result demonstrations have been laid out on a large scale by extension workers all over the country while composite demonstrations have been tried only in the intensive agricultural areas. Experience in the field has shown that composite demonstrations which receive adequate personal attention from extension workers have an impact on farmers while result demonstrations have not succeeded equally in attracting their attention.

A recent evaluation of the impact of demonstrations made by the Programme Evaluation Organisation has brought out the following defects :

- (1) Lack of proper supervision and follow-up.
- (2) Inadequate field training of the extension staff in conducting demonstrations.
- (3) Defective selection of plots.
- (4) Burdening the VLW with too many demonstrations which he could not effectively plan and supervise.
- (5) Lack of adequate cooperation from the farmer because of the absence of a full understanding on his part

of his role in the planning and implementation of the demonstration programmes.

These defects can be remedied by the sound planning of the demonstration programmes accompanied by personnel supervision at different stages. Every extension worker should be made responsible only for demonstrations which he can properly organise and supervise. The quality of demonstrations is of far greater importance than their number.

Experience has shown that very often farmers attempt to use fertilizer and other inputs on 'control' plots without the knowledge of the extension worker in their anxiety to get a good crop. This vitiates the objective of demonstration. The very fact that the farmer is attempting to do this is an indication that he is aware in some measure of the benefits to be obtained by the adoption of improved practices in increasing production. While laying out demonstration plots there seems to be no need for specific 'control' plots. The whole neighbouring area will in reality serve as a natural control area.

In addition to the usual demonstration programme referred to above there is need to develop the following special types of demonstrations with a view to producing a better visual and mass impact on the farming community :

- (1) *ABC demonstrations* based on soil analysis of individual plots. This will include treatment of plots on (a) manurial schedule based on soil analysis of the particular field, (b) manurial schedule as recommended for the tract, and (c) cultivator's method as control.
- (2) *Whole farm demonstrations*. These are necessary to impress on the farmer the overall benefits that can be got by treating the entire holding under improved practices.
- (3) *Area-wide demonstrations*. Such demonstrations will include the adoption of plant protection measures to control actively plant diseases and pests, rodents, etc., in a selected group of villages or a block; the development of correct water use and drainage for the command area of a tubewell or a distributory; the

adoption of soil conservation measures for catchment areas, large scale demonstrations of soil correctives ameliorants, etc.

- (4) *Nation-wide demonstrations.* Such demonstrations should be laid out by research workers with a view to demonstrating the maximum potentiality package of recommendations made by them. The experience of such demonstrations with high-yielding varieties during the last one year has shown that really impressive results can be achieved by such demonstrations. The programme of such demonstrations should be expanded in the coming years.

Demonstration will not be of much use unless the practices recommended are also economically beneficial to farmers and they are convinced of the benefits of improved practices in terms of additional economic returns. It is essential that the economics of the practices demonstrated should be an integral part of demonstration programmes. For this purpose it is necessary for the extension workers to be trained in the 'farm management' approach to agricultural development.

One or more of the extension methods mentioned can be used and individual or group action may be utilised. The maximum utility seems to be in a combination of several techniques. Field studies have shown that extension workers using only the demonstration method were able to influence a little over one-third of the village families to adopt improved practices, but where the workers used demonstrations, visual aids and the written word, almost two-thirds of the families were persuaded to adopt the new practices. Where most of the extension methods were employed it was possible to change the behaviour of as much as 98 per cent of the cultivators.

LINKING EXTENSION WITH RESEARCH

The organisation of the departments of Agriculture varies from State to State. The manner of linking agricultural extension with education and research varies with the organisational set-up. In the States which do not have agricultural universities

at present the functions of education and extension are discharged by the Director of Agriculture. He is assisted in the function of extension education by a Joint Director of Agriculture (Extension) who acts as a link between research and extension by modifying the improved agricultural practices and passing them on to the extension workers at lower levels. The Joint Director cannot perform this role in extension unless he is assisted by a team of subject-matter specialists. A few states have appointed subject-matter specialists at the State level. The majority, however, have yet to ensure that the latest results of research are passed on to field workers with the minimum delay. It is essential that a strong farm advisory service headed by Joint Director, Agriculture (Extension) with the assistance of subject-matter specialists should be created in all State Agricultural Departments in States where agricultural universities have not been established.

In the States where agricultural universities have been set up, the research and education activities of the Agricultural Departments should be taken over by the universities as early as possible. The Director of Extension in the university should attend to the same functions as the Joint Director of Agriculture in the State Department (Agriculture) mentioned above. The results of research should then be taken to the field through a team of subject-matter specialists appointed by the universities but working with the district staff of the departments of agriculture as has been done in the Agricultural University at Ludhiana in the Punjab. For ensuring their close cooperation with the district staff of the Departments and facilitating the coordination, subject-matter specialists have been placed under the control of the District Agricultural Officer. It is necessary to bring out such an arrangement wherever agricultural universities have been set up.

RECEPTIVITY OF FARMERS

The success of extension efforts is to be judged ultimately by the receptivity to new ideas which they develop among farmers. Actual production takes place on the fields of the

farmers and efficiency in agricultural production will be determined ultimately by the extent to which improved technology has been adopted by them. The training of farmers is, therefore, as important as the training of extension workers. Farmers, selected village leaders, farm women and young farmers need to be trained through well devised courses in agriculture and allied fields and their enthusiasm stirred through countrywide tours, field days and contacts with the outside world.

A study of the characteristics of 'Lay-Leaders' in extension work carried out in some tehsils of Allahabad district (Uttar Pradesh) has shown that the farmers in the age-group of 20 to 40 are most receptive to new practices. They are also in a position to translate the advice of extension workers into action. Persons below 20 years are not in a position to get their families to accept change as their status in the rural family and society is not conducive to such a role. But their training with the object of building them into future progressive farmers is very important. Older people over 40 show great resistance to change. It is interesting to note some of the other relevant conclusions of the study :

- (1) It is individual receptivity rather than higher education which results in the acceptance of a large number of practices.
- (2) Farmers with larger holdings take more readily to improved agricultural practices.

Extension agencies in India face a stupendous task. They have to assist 60 million farmers in day-to-day decision making in their agricultural operations. The problem in countries like the United States and United Kingdom with their larger sized holdings is much simpler as extension workers have to deal with only 2-4 million farmers. The natural resistance to change of a tradition-bound farming community has to be broken. Our experience of intensive agricultural programmes has shown that a switchover from traditional to scientific agriculture requires considerable effort to overcome the initial resistance of farmers. Once resistance is broken, continuous growth becomes possible if the necessary incentives and inputs are made available.

Summary of Discussions

The function of extension is to make available knowledge and technology as well as inputs necessary for agricultural development to the farmers. It is necessary that the agents of extension should be themselves equipped with the results of latest research. The problem of motivation of the extension agents is also important. In approaching the farmer, it is necessary to take into account his preoccupations. The agricultural colleges should also be more and more concerned with extension work. There is also a need for reorienting and training high level officials in extension. The present method of evaluation is based on field reports. There must be some other way of finding out how much work is being done through the extension programme and an independent organisation should make a study and assess the work that is being done.

The inability of getting timely supply of inputs can be corrected by toning up the administration. It is necessary to formulate the programmes by taking the farmers into confidence and remove the physical and material hurdles first, before recommending any particular programme to them. The question of agricultural prices is very important. This is one indicator which will always show what is going to be the focus of attention of the farmers. The techniques of individual and mass communication that have been used, had not been much of a success partly because these were not intelligently used, and also because the material to feed the apparatus was not there. Demonstration farms would be very helpful in this respect. It is also necessary to create an organisation which will transform the results of research in terms of both the extension workers as well as the farmers. This kind of organisation has to be created in the States.

The time has come when we should give increased prestige to agriculture. The portfolio should go to the Chief Ministers in the States which will give agriculture certain prestige. The extension workers and others who are involved in agricultural production should be given a social status. Transfer of extension personnel should be stopped for five years or so and

they should not suffer in terms of promotion because of their immobility. If their job is important, then the remuneration for it should also be attractive so that they are interested in their work. There is a need to improve the knowledge and competence of the people involved in community development or extension service. This is true for all levels of persons—from the VLW to the District Officer. The training should be practical and of a concrete type and they should be able to speak in a language which the farmers understand. The extension workers are not merely technical people, they should also be integrated personalities well conversant with the human problems in improving agriculture. There is understanding of the nature of problems involved in extension services, but the willingness to improve the situation is somewhat lacking.

The attention of the VLWs should not be diverted too much from agricultural work. There is also need for the evaluation of extension work in the villages. A second view expressed was the wisdom of transforming the VLW into a full-time agricultural extension worker. When the VLWs were created it was thought that they would approach rural problems in really an integrated way, and, therefore, their duties should be multi-purpose rather than single-purpose. We are now deviating from this concept. It was also pointed out that without supporting technical facilities, it is not possible for the extension workers to answer all the technical questions posed to them by the farmers.

Non-official organisations are also important in extension work. The enterprising farmers themselves can work as agents of extension and do the job most effectively. The BDOs should henceforth take a greater interest in agricultural production. He should preferably be a man qualified in agriculture. The panchayats as well as the farmers' associations or committees should be associated with the agricultural work. It is desirable to associate people with technical qualifications in agriculture with its administration and from this point of view the proposed all-India Agricultural Service is a worthwhile suggestion.

The graduate extension officer has too little practical experience while the VLW has too little acquaintance with theory. In

Israel, an agricultural graduate cannot get his diploma or degree without a year's practical experience in a farm. For the primary extension worker in Israel there are primary and secondary agricultural schools. In the Indian training schools for the VLWs, there is not sufficient flexibility in the syllabus and the students are not encouraged to work out their own ideas.

At the district level there should be subject-matter specialists. The line of communication from the village to the State headquarters should also be shortened and made more direct. There should also be an emphasis on mixed farming to some extent. In the schools there should be a bias towards agriculture. The teachers can also act as extension media because of their knowledge, status and authority among the local population. The question of incentives to extension workers is also important. Field level workers should get promotion without being moved out of the fields. It is important to involve farmers in the work of extension. The better farmers should be trained and asked to act as agents of extension. Similarly, rural youth should receive training in improved methods in agriculture and work in the villages.

When the community development movement was started in 1952, the accent was on rural amenities and non-agricultural work had priority. In the context of the present agricultural crisis, there is need for reorientation of the rural extension programmes. We should continue with the matriculate VLWs, instead of replacing them with agricultural graduates, but there is a need to train them. It is difficult to retain the agricultural graduates in the villages, and psychologically also they are somewhat removed from the farmers. The VLWs should have better promotion chances. At the same time, continuity of experience is also necessary.

The different agencies working for the farmer should also have a unity of outlook and purpose. There are some difficulties in making the Agricultural Extension Officer a Class I Officer, because he has to work under a Project Officer who is already in Class I cadre. The line of promotion to the position of the Project Officer should be clear for persons who are working

in agriculture and the allied branches like cooperation, veterinary, poultry, diary development and so on.

The supply of inputs should be routed through agencies like cooperatives or, panchayats or even farmers' associations, in order to involve the people in agricultural extension. Extension work means largely contacts between extension workers and the farmer. These should be increased.

The role of a university in extension can be extremely useful. Intelligent farmers could be brought into the campus for short periods and exposed to discussions connected with field problems such as soil conservation, improved seeds, insecticides, fertilizers and so on. Experts can be brought into a discussion of the cultivation of the dominant crop in the area from where the cultivators come. Field trips to well run farms could be also arranged for them. This kind of advice and demonstration has an impact on the farmer. The acceptance of poultry and mixed farming was brought about through this type of visits undertaken by the Agricultural University in Ludhiana. This type of extension among the farmers would be fruitful.

The universities could also act as supporting bases for the facilities of laboratory testing and expert advice. A literacy drive should be undertaken among the farmers before we can expect a break through in agriculture.

Our extension organisation has to be flexible enough to accommodate the diversity in physical conditions and a single form of extension is not appropriate. Unless we change our pattern of extension to suit the agro-climatic conditions and other factors, a blanket form of extension programme will not succeed in our country. The emphasis was also laid on the need for linking production with incentives. The subsidy programme also has to be more discriminating and take into account the resources of the farmers. If we want science to come to the aid of Indian Agriculture, then we must be prepared to pay for it. The question of economic feasibility is important in advising on improved practices. It is necessary to see that the demonstrations carry not only technical knowledge but also economic conviction.

There is also need to match the programmes to suit the requirements of particular areas. The extension workers can

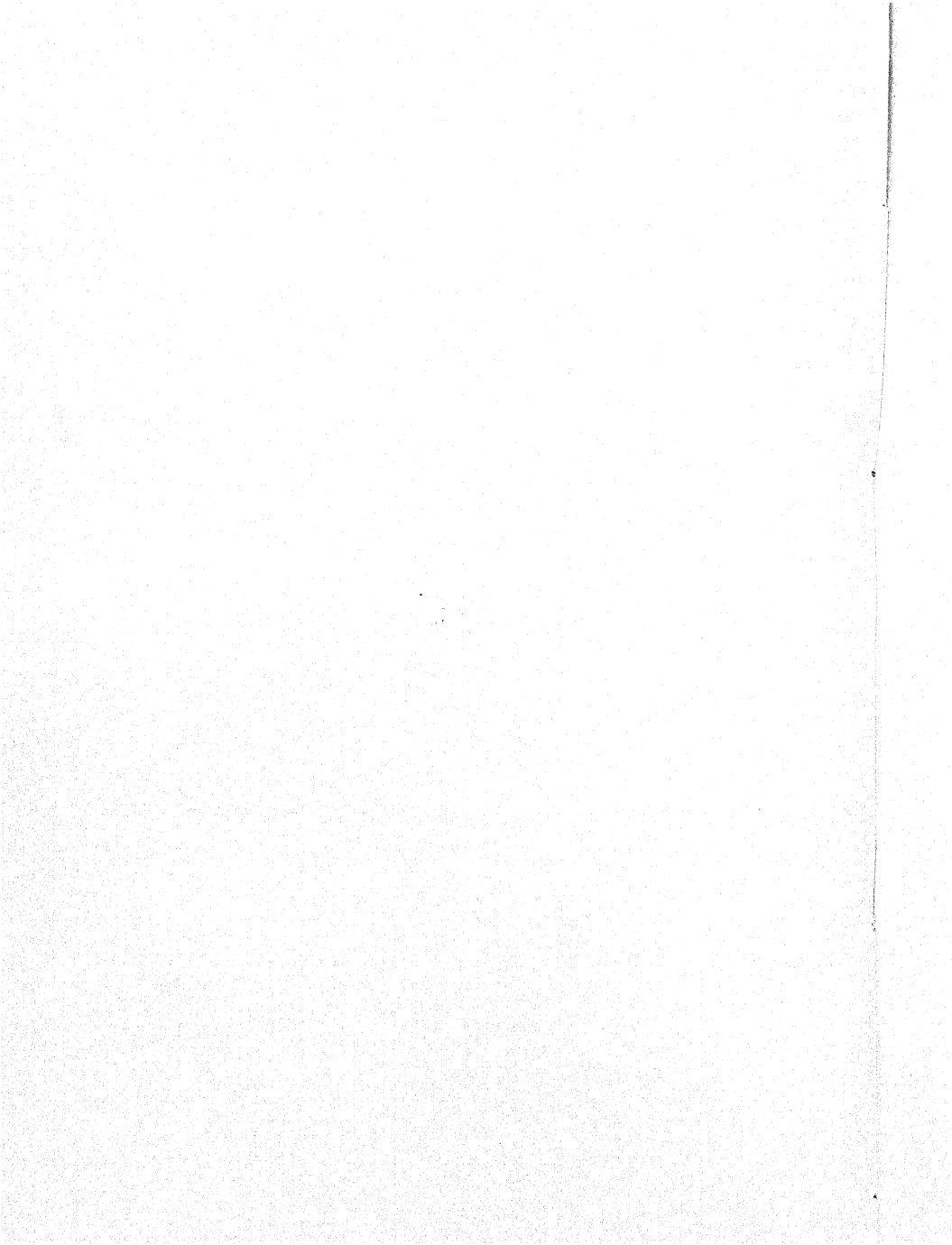
also advise the farmers about the right type of crops to be sown in different plots scattered over a large area. The cultivation of crops which have a high food value or which can be grown in marginal lands can be popularised. The extension service should also provide adequate information about cash crops. It is necessary to direct agricultural research to concrete problems at the field level. Some research, for instance on the replacement of cow dung as fuel in the farm yards which should be as cheap and as combustible, could be attempted. Regarding farm mechanisation it was suggested that it is necessary to examine what machinery suited Indian conditions. Farm mechanisation does not mean only tractorisation, but includes the whole process of farm operation. We do not need any special type of tractors. What are needed, are repair and service facilities of the equipments and an adequate supply of cheap fuel to run them. It should be our aim to mechanise farm operations as soon as possible.

The question of price incentives is extremely complicated. We have to take into account the relative prices of different agricultural commodities. Incentives should be production or productivity-oriented. Without increased productivity there is no scope for raising agricultural prices, since any artificial increase will be counter-balanced by rise in the prices of inputs. The main problem is to control relative prices. The real problem of agriculture is not prices, but shortage of inputs. The development of agriculture has to be tackled mainly on that front. Regarding a national price policy, the government has accepted the principle of support prices for a number of agricultural products. The farmers now have this guarantee that the prices of these commodities will not be allowed to fall below a particular statutory limit. The support prices are not remunerative but the mere fact of floor prices at which the government stands committed to purchase unlimited amounts of these products is a great boon to the farmers and acts as a real incentive for agricultural development.

In fixing support prices we have to see that the cost of cultivation of progressive farmers is guaranteed. On the questions

of parity between prices received and paid by the farmers the data is inadequate. It is possible to guarantee price but not production. It is, however, possible to introduce a crop insurance scheme to help the farmers in times of drought so that production can be ensured to some extent.

PART II



IRRIGATION, FLOOD CONTROL AND DRAINAGE

D.B. ANAND

INTRODUCTORY

Irrigation is the controlled application of water to meet crop requirements left unsatisfied by rainfall, and is a fundamental need for agricultural production in areas where the rainfall is either scanty or is not suitably spaced in point of time during the growth of the crop. The irrigation engineer attempts to bring the water to the land through the distribution system according to the requirements and at the times needed for the growth and maturity of crops.

Irrigation has been practised by men for several millennia. Perhaps, the earliest irrigation started in Egypt on the river Nile, and there are indications of irrigation as early as 5,000 B.C. There is evidence of a masonry dam having been constructed across the Nile in about the year 4,000 B.C. Irrigation in India is equally ancient, and from numerous references to tanks, dams and canals in old records, it would appear that artificial irrigation was practised in India at least as early as the fourth millenium B.C. A notable example is the construction of the Grand Anicut across the Cauvery in about the second century A.D., which structure was remodelled by the British during the 19th century.

India embarked on planned economy in 1951. Although during the years after the Second World War some reconstruction schemes in irrigation were planned and taken up for construction, a dynamic policy for irrigation can be said to have started only with the initiation of the First Plan in 1951.

Quite a number of irrigation schemes were in existence and operation before the start of the First Plan. The total water that was utilised by these pre-plan Schemes was of the order of 76

million acre feet. The utilisation at the end of the Second Plan (1960-1961) amounted to 120 million acre feet, *i.e.*, 27 per cent, and at the end of the Third Plan, is expected to rise to 160 million acre feet, *i.e.*, 36 per cent of the utilisable flows. This pace of utilisation of the country's water resources is expected to continue during the future Plans.

IRRIGATION UNDER THE PLANS

Productivity was the criterion for sanction of irrigation schemes in the latter part of the nineteenth century. This meant that the net return should be more than a fixed percentage of the "sum at charge" within 10 years of the date of the completion of the Project. The Indian Irrigation Commission of 1903, however, suggested a different criterion: "In considering proposals for new irrigation works, the Commission will understand that greater importance may often be attached to the extent and reliability of the protection that will be afforded, than to the merits of the schemes regarded as financial investments." The Commission, accordingly, recommended a number of protective schemes, some of which were undertaken. Nevertheless, owing to World War I, and the consequent paucity of funds the emphasis continued to be on the productiveness of irrigation projects.

In the planned economy of a country, however, it is necessary to develop all types of resources that may be available. Water is a very important resource, and, therefore, the stress now is to make the best use of this resource for various purposes, like irrigation, domestic water supply, industry, navigation, etc. Thus, the emphasis on "productiveness" has been considerably relaxed.

For planning purposes irrigation schemes have been divided into three categories, namely, major, medium and minor. Up to the year 1964, the Plan schemes costing up to Rs. 10 lakhs were called minor schemes; the ceiling has since been raised to Rs. 15 lakhs. Schemes costing up to Rs. 5 crores are designated medium schemes, and those over Rs. 5 crores, as major schemes.

The sown area (1962-63) in the country is about 386 million acres gross. It has been assessed that the total possibility of

irrigation coverage by major and medium schemes is about 112 million acres (assessed as 100 million acres in the formulation of the Third Plan), and about 75 million acres by minor schemes, *i. e.*, a total of about 187 million acres by all types of irrigation. This obviously points to the need for great care in the proper utilisation of the scarce water resource, so as to be able to serve as much areas as possible, for the fast-growing population of the country.

During the First Plan 230 major and medium schemes were undertaken, of which 54 only could be completed. The expenditure during the First Plan amounted to Rs. 380 crores. During Second Plan, the total number of continuing and new major and medium schemes was 351 of which 80 were completed, the expenditure being about Rs. 370 crores. The Third Plan started with 271 schemes continuing from the earlier Plans and 95 new schemes were initiated, *i.e.*, a total of 366 schemes have been under execution. The total expenditure during the Third Plan ending March 1966 is expected to be Rs. 564 crores. By the end of the Third Plan, 298 major and medium schemes are expected to be completed, and 202 would continue into the Fourth Plan. The achievement during the Fourth Plan would depend upon the allocation of funds, the final figure for which has yet to emerge.

IRRIGATION POTENTIAL

Of the total 112 million acres which could ultimately be served by major-medium schemes, about 24 million acres were under command before the start of the First Plan. This potential rose to 30.3 million acres during the First Plan to 35.1 million acres at the end of the Second Plan, and it is expected to be about 42.7 million acres. When, however, all the schemes, accepted in the first three Plans, by the end of the Third Plan are completed, it is expected that an additional potential of 44 million acres would have been created over and above the pre-Plan potential of 24 million acres. Future irrigation planning would, therefore, need to cover the remaining irrigation potential of about 44 million acres; this would be the task during

the Fourth and the subsequent Plans in the major-medium sector.

MINOR IRRIGATION

Minor irrigation, as the word implies, consists of small projects, which can be constructed quickly, and yield early benefits; this also covers works which can be constructed by the cultivators themselves at small cost. The minor works make use of surface water resources by small storage and diversion schemes, lift irrigation schemes, and of underground waters by dug and tube wells. This sector also covers other items, like water conservation, ground water re-charge and small drainage and flood protection schemes, etc. The financial limit for such schemes has been mentioned earlier.

Individually owned minor irrigation works are popular with the farmers in this country. The tube wells are usually a more reliable form of minor irrigation. The small storages and dug wells depend upon local surface, re-charge, which is mainty from the monsoon, and, threfore, suffer from the drawback of lesser reliability when the monsoon fails.

Of the total potential of 75 million acres under minor irrigation, about 32 million acres had been covered before the start of the First Plan. During the First Plan, a further net acreage of 4.5 million acres was added, which grew to 11.1 million acres at the end of the Second Plan, and is expected to rise to 17.8 million acres at the end of the Third Plan, thus making a total of about 49.8 million acres under minor irrigation at the end of the three Plans. This would leave a further potential of about 25 million acres to be created during the Fourth and future Plans.

Minor irrigation has an important role to play in the agricultural economy of the country, as the schemes can render service independently, and/or in conjunction with major-medium schemes, and as they can be constructed in short periods with small outlays. There is, therefore, considerable scope for accelerating the progress of minor schemes for local needs.

Underground water resources are a major contributor to the acreage under minor irrigation. It is, therefore, necessary to

assess the availability, extent and optimum use of this resource. Some of the States have started surveys of underground water resources to enable more scientific planning.

The Exploratory Tube-wells Organisation in the Union Ministry of Agriculture is, at present, the main organisation which undertakes scientific drillings and assessment of availabilities of underground water resources. Exploration, however, is left to the State Governments, or private owners.

SPRINKLER IRRIGATION

As the word implies, this type of irrigation means supply of water to crops by sprinkling, rather than by flow along the ground. This involves an over-head tank, pump (or a portable pump-trolley), pipes and sprinkling arrangements, which are expensive. This type of irrigation, however, has the advantage that water can reach even unlevelled land, and that the requirements of water are reduced, as the seepage losses are negligible.

The installation costs for a portable system work out to about Rs. 500 per acre, and the operating costs, including depreciation, to about Rs. 10 per acre-inch. It should, thus, be seen that, for ordinary crops, the system is expensive, and has not, therefore, yet found any significant acceptance in this country. The system, however, is being used in coffee and tea plantations, which can bear the costs. The area under a sprinkler irrigation in 1964 was about 25,000 acres, with about 300 installations.

There is room for experimentation on this type of irrigation in various regions for various types of crops, like orchards, etc. Experiments would include water requirements for various crops, effects on soils and salt balance therein, economics, and possibility of complementary use with established irrigation systems.

FLOOD CONTROL AND DRAINAGE

Large parts of the country are victims of ravaging floods in rivers during the monsoon. These floods wash away soil, deposit sand on cultivable land, and cause loss of life and property.

With the extensive construction of railways, roads, canals, etc., natural drainages have got blocked, or reduced in many cases. Furthermore, cutting out forests and putting extensive areas under cultivation have reduced the flood absorption capacity of the land, thereby resulting in increased flows in natural drainages, as well as submergence of land where the drainages have been blocked.

The general types of work for flood control are detention dams, embanking of rivers and construction, renovation and re-grading, etc., of natural drainages. The D. V. C. dams, the embankments along the Brahmaputra, the Godavari, the Kosi and along other rivers in the country and the extensive construction of drains in the Punjab are examples of such control measures.

Lack of proper drainage of surface or sub-surface waters in irrigation land leads to a rise of the sub-soil water level and the deterioration of land resulting in very poor yields. The importance of adequate drainage in irrigated areas cannot be exaggerated and must be provided as soon as surface or sub-surface conditions indicate its necessity.

The States are alive to the importance of the measure and extensive programmes in the Punjab and elsewhere are topical examples of the work being done in this regard.

In the Second Plan flood control was a centrally sponsored programme. In the Third Plan, however, flood control, drainage and anti-water-logging schemes formed part of the State Plans.

The expenditure on flood control and drainage during the First Plan was Rs. 13.8 crores and during the Second Plan Rs. 49.1 crores. It is expected to be 85 crores during the Third Plan. Substantially increased allocations would be needed in the future Plans.

PROJECT PLANNING

Irrigation schemes up to the beginning of the century, were mainly diversion schemes on rivers. The flows, however, were not constant, therefore, such diversion schemes could not make

use of the total water resources in the river basins. Also, such a set-up was not very conducive to assured supply during the whole year, and, therefore, led to fitful development of cropping patterns. Examples of such diversion schemes are found in all parts of the country.

In order to make optimum use of the water resources of river basins and to have assured supplies on planned crop patterns during the whole year, it became necessary to think of storage dams which would hold the heavy flows of the monsoon and release water throughout the year by regulated supplies for irrigation and other uses. A few such storage reservoirs were constructed after the First World War, amongst them being Bhatgar and Bhandardara in Maharashtra, and Mettur and Krishnarajasagar in Madras and Mysore. Rapid advances have since been made in soil mechanics and concrete and masonry construction, thus enabling the construction of higher dams, capable of storing more of the waters of the rivers. The present planning, therefore, is mainly based on storage dams with, where so required by the local terrain, downstream diversion weirs, for locating the canal take-offs.

In many states, reconnaissance has been made in the past, and reports exist about probable areas and sites for irrigation schemes; master-plans for the development of water resources of river basins are also in hand in a number of States. The C.W. & P.C. has also carried out studies and compiled basin plans of probable utilisations for 23 river basins. These documents and toposheet studies indicate probable sites for development, which are confirmed by site investigations. Cropping patterns are devised, depending upon local conditions and the existing crops, in consultation with the local agricultural departments and proper water planning effected in the preparation of projects.

Irrigation is a state subject. Since the start of the Plans, however, the financial content of each Plan is assessed by the Planning Commission as also the overall plan for each State in consultation with the States concerned. As part of this planning process, the States do not undertake any major or medium

projects, unless they have been accepted by the Planning Commission and the Government of India and included in a Five Year Plan. Central loan assistance is subject to such acceptance by the Centre.

All major and medium projects are prepared by the state governments (sometimes, also, with the help of the C.W. & P.C.), and sent to the C.W. & P.C., for technical scrutiny, which broadly comprises the technical feasibility, designs and reasonable assessment of the cost estimates. Such scrutiny also tends to bring uniformity in criteria and designs. When so desired by a state, projects are, in their entirety investigated, planned, designed and prepared by the C.W. & P.C. on the state's behalf and cost. After scrutiny by the C.W. & P.C., in conjunction and discussions with the states the project is placed before the Technical Advisory Committee of the Planning Commission for approval before clearance by the Planning Commission. It is only after such clearance that the Plan allocations are made by the Planning Commission for individual projects.

WATER AVAILABILITIES

As already mentioned the utilisable quantum of water will not be enough to economically serve all the cultivable land. There is, therefore, a competing demand for this scarce resource, the competition becoming keener where the rivers pass through more than one state. Such water demands usually lend to disputes and claims. Quite often, the states concerned come to mutual agreements regarding the distribution of waters of particular river basins. Sometimes, however, they are unable to do so; the question of distribution of Krishna and Godavari waters is an example of such a water dispute at the present moment.

In order to deal with such disputes Parliament passed the Inter-State Water Disputes Act, 1956, which provides for arbitration by a person to be nominated by the Chief Justice of India. It is, however, the usual experience that litigation in the matter of water disputes is a long-drawn-out affair, which holds up development. It is, therefore, best in the long run for the

parties to come together, and find solutions acceptable to all concerned with the help if necessary of a third party like the Union Ministry of Irrigation and Power. This is a method which the Ministry of Irrigation and Power advocates and tries to follow.

There can be little doubt that in settling matters of water rights mutual agreement among the riparian State is the better method. For the optimum utilisation of river flows, it is necessary to make master-plans for complete river basins. Haphazard and isolated development can be wasteful and expensive. To deal with this problem, the River Boards Act, 1956 was passed by the Parliament. This Act provides for the setting up of River Boards for single or more river-basins. The Boards are meant to coordinate the activities of the concerned States, undertake investigations with regard to water availabilities and feasible project sites, and to draw up master plans for the development of river basins. It has not yet been possible to set up these Boards. According to the present thinking, however, it is proposed to set up an organisation in the C.W. & P.C. for regional planning by river-basins of the country. The organisation would function almost in the same manner as visualised in the River Boards Act but could be more easily and expeditiously set up thereby making possible an early start towards basin-wise planning.

The basic data needed for any kind of irrigation planning is the quantum of river flows available. For this purpose, the state governments have set up River Gauging and Discharge Organisations, whose sole purpose is to scientifically observe the river-flows throughout the year on a long-term basis. These observations form the basis of calculations of water availabilities. There is a further proposal of setting up over 200 key stations for observing river data under the purview of the C.W. & P.C. These stations will cover all the important rivers and important States as an independent assessment.

It is essential that such key-stations are set up as soon as possible and that the data is published and provided to the states. It is also necessary that all the states regularly observe

and publish data regarding rainfall and river flows. These organisations are basic and should be placed on a permanent footing, and not axed even in emergencies like the present. The cost of collection of such data is insignificant, when compared to the cost of projects and the benefits that accrue from the correct assessment of river flows and flood discharges.

CRITERIA FOR ACCEPTANCE OF PROJECT

As stated earlier, the sanction of irrigation projects was subject to the productivity test in the last century. The acceptance of protective schemes was advocated early in this century but could not be universally implemented. On account of the fact that cheaper sites have been developed over the years, and due to rising costs, irrigation projects have become quite expensive. The usual capital cost of projects now amounts to about Rs. 400 to Rs. 1,000 per acre, and more. The existing rates of water charges for most crops cannot meet even the interest charges on these costs, much less the cost of maintenance and operation of the projects. There has, therefore, been a persistent clamour for the review of the criteria for acceptance of projects.

The Planning Commission, therefore, appointed a Committee for considering the criteria for appraising the feasibility of irrigation projects. Similarly, also, a Committee was appointed by the Union Ministry of Irrigation headed by Shri Nijalingappa, Chief Minister of Mysore State and comprising Irrigation Ministers of a number of other States. The gist of recommendations of both these Committees is that the criteria for acceptance of the irrigation projects need a change, on account of the fact that irrigation not only helps the user but yields many other benefits, both direct and indirect. They have, therefore, suggested that a project should be considered acceptable if the direct benefits bear a certain ratio to servicing costs. The Nijalingappa Committee has suggested that the "Economic benefit criterion should be adopted for sanctioning irrigation projects, instead of the present financial criterion. For this purpose, it will be necessary to lay down detailed instructions for working out the benefit-cost ratio "

The benefit-cost ratio is an important criterion which the Technical Advisory Committee of the Planning Commission takes into account while recommending projects for acceptance

FINANCING

The financial allocations are made by the Planning Commission after taking into account the resources of the States and adding thereto contributions as loans and grants. For accounting purposes the total expenditure on the projects is considered as loans on which interest and other charges have to be met. In this connection, it is interesting to note that this is not the method universally adopted. In the U.S.A., for example, the capital cost of the projects is recovered in 40 to 50 equal instalments without any interest charges; and thus, the recovery is limited in time and extent. In Thailand, the Government finances the entire cost of irrigation projects from reserves or loans and operational charges from general revenues. The Government does not collect any water charge. In the Philippines capital costs are recovered and the beneficiaries only pay for operation and maintenance.

In India no recovery is made for the capital cost but attempts are made to cover interest, maintenance and operational charges through water rates and ancillary receipts. There is also a general policy of recovering betterment levy from the lands to be benefited from the projects. The financial return is then calculated on the amount of the capital cost less the betterment levy. If the net financial return does not cover the interest charges the acceptability of the project is assessed on the benefit-cost ratio. In the present method of financing irrigation projects, interest charges start accumulating from the date of the sanction of loan which means the date on which the construction of a project is started. These compounded interest charges become a heavy burden on the capital cost even before the project has started earning any revenue which tends to make the project unproductive. In view of the foregoing comments, there would appear to be a justification for review of the mode of financing of our irrigation projects. Some of the alternatives

could be abolishing of interest, giving moratorium for the accumulation of interest, financing the total cost by Government, etc.

While on the one hand, there is need to review the criteria for financing of irrigation projects, there should be on the other hand, an equal stress on increasing the production per acre from irrigated land. This would result in higher income to the cultivator, enabling him to bear a heavier charge per acre, and leading to higher revenues to Government from water rates and/or other levies on irrigated land.

CONSTRUCTION

After the projects have been cleared by the Planning Commission the construction is undertaken by the States, for which funds are obtained by annual allocations after discussion of the annual plans with the Planning Commission. The construction agency depends upon the magnitude and annual financing pattern of the project. In projects of large size, extensive coverage and heavy cost, it is usual to have specific administrative machinery, which may be at the level of a Superintending Engineer, or a Chief Engineer, with supporting staff. The examples of Nagarjunasagar, Koyana, Ukai, Ramganga and Rajasthan Canal could be quoted, where Chief Engineers have been appointed for the execution of the Projects. In smaller projects, a Superintending Engineer, or even a lower charge would do. Such specific administrative set-up helps in coordinated and expeditious work and is to be welcomed.

It is now almost the universal practice to appoint Financial Advisers and Accounts Officers on big projects so as to help relieve technical officers of a lot of accounting routine. It is also the usual practice to constitute Control Boards for such big projects, in order to watch the progress and to expedite decisions towards speedy execution. In the case of uni-State projects, the Control Board is usually presided over by a Minister from the State. In the case of multi-State Projects, the Chairman could either be the Governor of a State, or the Union Minister for Irrigation and Power. The

Koyna and Ukai are examples of uni-State, and the Balimela, Beas and Chambal are examples of multi-State projects. These Control Boards meet about 4 to 8 times a year, to transact business. The Control Board consists of the State Ministers in charge of Finance, and Irrigation and Power Departments, the Chief Engineer concerned and representatives of the Finance and the Irrigation & Power Ministries from the Centre, with representatives of other concerned interests.

For speedy construction, assurance of funds, construction materials, construction equipment and trained personnel are essential. The main bottleneck being experienced at the moment is the lack of foreign exchange for procuring heavy construction equipment. For example, the demand for foreign exchange required for irrigation and multi-purpose projects during the Third Plan, amounts to Rs. 73 crores, against which the total allocation up to March 31, 1965, was Rs. 33 crores. Such a shortfall would result in slowing down of progress on Projects.

The Union Ministry of Irrigation and Power has recently finalised a scheme for creating a Central Equipment Pool for which bulk foreign exchange may be forthcoming from some foreign-aid agency. The equipment will be controlled by the Ministry, and loaned to the States/Projects on hire.

In certain States there is a shortage of technical personnel in varying degrees at the higher levels, but more uniformity at the lower levels especially of overseers. The shortage of mechanical staff and operators of equipment is very common. In this connection, the C.W. & P.C. runs four Training Centres for earthmoving equipment, distributed over the various regions of the country. These have proved extremely helpful in training of operators/mechanics who have been very usefully employed on the construction of projects. Such a programme should not only be continued but intensified.

The availability of controlled materials like cement and steel is another very serious bottleneck which affects the progress of projects. Even though designs are made to reduce the requirements, it has still not been always possible to meet the needs fully. For example, against a total demand of 25,000

tonnes of controlled categories of steel during the year 1964-65, only about 6,000 tonnes could be allocated to irrigation and multi-purpose projects. Steps should be taken to meet the needs of vital irrigation and multi-purpose projects.

PROJECT PRIORITIES

A very large number of major-medium projects have been undertaken in the country. The total cost of projects, included in the first three Plans is estimated at about Rs. 2,300 crores. The total expenditure anticipated during the three Plans ending March, 1966, is expected to be of the order of Rs. 1,325 crores, thus leaving a balance of about Rs. 975 crores, to be spent during the Fourth and future Plans on the works that will spill over from these projects. Out of the major-medium projects accepted during the three plans 298 are expected to be completed by the end of the Third Plan, resulting in 202 projects continuing into the Fourth and future Plans. Of these continuing schemes, it is expected that 178 would be completed during the Fourth Plan and 24 will continue into the Fifth Plan. The schemes spilling over beyond the Fourth Plan are of large physical extent and need for their long time construction. Attempts are being made to complete as many schemes as possible in the early part of the Fourth Plan so as to achieve added food production.

Some of the significant reasons why the schemes take so long in execution are rise in prices, insufficiency of initial investigations, change in scope, revision of estimates and low annual allocations. It is necessary to consider suitable measures to assure more reasonable investigations and finalisation of schemes and earmarking of funds and equipment for schemes in such a way as to assure completion at the optimum rate. This would also imply limiting the number of schemes under construction at any one time to within the availabilities of the various components like finance, foreign exchange, trained personnel and key-materials. At the present moment there is a tendency to undertake more schemes than could, perhaps, be completed at the optimum pace of availabilities. This

thin-spreading of the resources leads to longer periods of construction, with consequential higher costs in supervisory establishment and progressively increasing prices.

The best way to construct a large number of schemes would be to construct them in small batches, which can be completed quickly one after the other. Another suggestion would be to earmark funds, especially for the important schemes, so that their progress is not hampered by transfer of funds elsewhere. It would also help if allocations are guaranteed for the total period of construction, or, a plan-period, rather than by annual dribbles which militate against optimum and efficient construction programmes.

WATER TO THE FIELD

The irrigation supplies from the Government Projects are made available from *pucca* outlets constructed by the Government on the distribution channels, like distributaries, minors and sub-minors; direct outlets from major canals and branch canals are also sometimes given. The commands of the outlets are usually fixed between natural sub-drainages, so that the main water course may be constructed on the ridge-line and field channels away from the water course, thus facilitating easy command. The Planning Commission has advised the States that the command of the outlets should be so fixed that the discharges are limited to between 1-3 cusecs, which means serving between 100 to 300 acres on each outlet. Further considerations in the fixing of outlet commands are that the length of the main channel should not be so long as to result in a lot of seepage loss, and that the number of users on each outlet should be reasonable to facilitate distribution of water.

The construction of the water courses and field channels is the responsibility of the beneficiaries, but the Irrigation Departments are expected to align the main water course and to advise the irrigators thereof. The responsibility for excavation of the water course and field channels has, in certain cases, been laid on Panchayat and Zila Parishad organisations. The Irrigation Act usually provided for the excavation of these channels

in case of recalcitrant irrigators, at the cost of the beneficiaries. Certain powers have also been given to the Panchayats in this behalf. The maintenance of the water courses and field channels has to be carried out by the irrigators concerned.

Before an irrigation project is considered complete the construction of the outlets (permanent or temporary) has to be assured. Enough progress has not, however, been achieved in the construction of water courses and field channels in a number of projects. This, amongst other reasons, is due to lack of corporation amongst the irrigators, lack of finance, obstructions to land going under the channels, and absentee landlords. Even where the channels have been constructed, they are not always up to requirements, thus resulting in breaches and insufficiency of water. In the States where irrigation is an established practice, there is less difficulty in this regard. It is, however, necessary that there should be a proper drive for the completion of the water courses and field channels, concurrently with the completion of the distribution system and outlets in irrigation projects.

Opinions have been expressed that water courses and field channels up to, perhaps, 25 acre block, may be constructed at Government cost, recoverable from the beneficiaries. This would raise the question of land acquisition, ownership and future maintenance; besides if this is done the users would not feel enough interest in this very vital link in the water conveyor system. Furthermore, with the stress on cooperation, and the coming in of the local Panchayats and similar organisations, it will appear to be a retrograde step for the Government to take over this particular item. This would also need a very large technical staff, which is not available even at higher costs. It has also been the experience that wherever water course and field channels have been so constructed, it has not been always possible to recover the cost from the irrigators.

The proper end use of water on the field connotes the success of an irrigation scheme. All possible attempts are, therefore, made to assure conditions for proper utilisation of supplies and this needs action by various departments.

In order to assure speedy utilisation after creation of potential the Planning Commission has suggested area programmes for the field, which embrace coordinated action by all the concerned departments, and covers items like alignment and excavation of field channels, soil surveys, tractorisation and levelling of land, demonstration farms/plots, fertilizers and improved seeds, marketing facilities, consolidation of holdings, etc.

Quantum of Water

As already mentioned, the utilisable water resources fall short of the land availabilities. In most river basins, therefore, it would not be possible to cover all the land with irrigation. On the other hand, there is a large rural population dependent on the land for livelihood and it is desirable to provide them facilities for improving their living conditions even though the full demands cannot be satisfied. In the design of irrigation projects, therefore, consideration has to be given as to how to serve the maximum area to the advantage of the maximum numbers, with the available water resources. Other considerations like scarcity and backward areas have also to be given due weightage. It is, therefore, that the intensities of irrigation on the projects are usually less than 100 per cent, which means that every acre in the command does not get water every year. It would, of course, be economical to aim at higher intensities which could result in shorter lengths of canals, and lesser maintenance and operational expenditure; but this would result in service to lesser number of people and smaller areas.

To make the best use of available knowledge, and inputs, it is necessary to carry out research, and experiments correlating production with varying combinations of inputs for varying crops, climates, and soils in the country. Decisions regarding frequency and quantum of water dosages could be based on the results so obtained in such a way as to utilise the available water resources for the optimum benefit of the largest area. In the context of scarcity of the water resources, the stress should be on the maximum production per unit of water, rather

than per unit of land, accepting of course, a minimum norm for per acre production.

Water Management

Irrigation has grown in various forms in the country. In predominantly paddy States, for example, irrigation water is used from field to field, while in most areas, proper water courses and field channels are constructed for a more scientific use of water. It will be realised that field-to-field irrigation is wasteful, as it leads to a large amount of soakage and evaporation losses, washing away of fertilizers, and hardly much control on the quantity of water utilised. Also such a system militates against a second crop, other than paddy, for which areas are scattered and field-to-field irrigation is not possible. Attempts are being made to persuade all States to insist on proper courses and field channels for water distribution.

Irrigation channels are designed on the basis of planned crop patterns and expected requirements of water dosages. If water users do not practise economy in water use the planned acreage cannot be achieved.

Water supplies are given in various ways. For example, in certain States in the north, a fixed quantity of water is allowed per thousand acres of command. In certain other States, water is allowed on application by sanctioning acreages for each season. In certain States water is let into the channels to satisfy the demands of the users without any control on the quantum of water so supplied.

The best method would, of course, be to sell water by volume, in which case the user will pay for the quantum of water received and will use it as he desires. It has, however, to be realised that the net return from the same quantity of water use is not the same for every crop, and therefore, the user could not afford to pay a constant price. Again, the number of users on our channels is large on account of small holdings which makes it impossible to effect individual measurements of supplies. It is also impracticable to obtain, instal, and maintain such a colossal number of measuring devices, which would involve heavy

expenditure, as well as, loss in commands on account of the differential water levels required by every measuring device. For these and similar other reasons, sale of water by absolute volume has not been found practicable.

Misuse and Mismanagement of Water

Further measures are also needed to conserve water for optimum advantage. It is necessary, for example, to check the misuse and wastage of water. This can be done by imposing penalties on such wastage and misuse. This is current in a number of States, but the rules are not always applied; there is room for tightening up. Since the calculation of needs and supply of water are the primary responsibility of the Irrigation Departments, the control of misuse and mismanagement should also be within their purview so that they could keep a proper water account, and match supplies with requirements.

Almost 40 to 50 per cent of the water let into the canals is lost by evaporation and seepage before it reaches the field. Lining of channels by concrete, masonry tiles, etc., would reduce the losses by about 66 per cent but lining is extremely expensive and not always economically feasible in the context of our financial resources. Lining is, therefore, usually resorted to in locations where soils are pervious and are justified by other strong reason like scarcity of supplies, nearness to urban areas, etc. Lining of the entire Rajasthan Main Canal is an example.

A substantial water loss takes place in the water courses and field channels. Significant savings could be effected if these could be lined with some cheap materials by the users. Experiments for cheap linings have been in progress, specially in the U. P.; no universal cheap form of lining has yet been found.

Irrigated Agriculture

With the extensive irrigation programme undertaken in the country a large number of irrigation projects are being constructed in areas where the farmers are accustomed only to dry or rain-fed farming. The continuous supply of water changes the whole aspect of agriculture as it brings in new crop-patterns,

double and triple cropping, improved seeds, fertilizers, pesticides and other scientific practices. There is, therefore, need to study the use of all these inputs for various crops in the different regions of the country and to disseminate this information among the farmers through extension agencies. This is usually done by opening regional research stations, research-cum-demonstration farms, and demonstration plots on the cultivators' fields.

It is also to be realised that irrigation systems can work only to certain regimes, like rotational periods on which the canals have to be designed and constructed, and water supplies made and assured to all users. Agricultural research, therefore, has to take these regimes into account and to advise the farmers accordingly. There is no doubt that proper coordination is necessary and the most practical regimes should be evolved taking into account the requirements of agriculture and reasonable regimes for water supplies in the interest of economy and optimum benefit.

It is necessary that research stations, demonstration farms and demonstration plots should be distributed all over the project areas so as to cover various soil-climate complexes. This is already being done to some extent and extensions are being planned.

For achieving maximum benefits, however, it is felt that in each State a high-placed Agricultural Officer with supporting staff is made responsible for research and development of irrigated agriculture within the commands of irrigation project. For effective control and utilisation, the planning and budgeting of irrigated agriculture should be distinct from those of the general Agriculture Department. It is desirable to attach such agricultural staff to the Irrigation Departments of the States for carrying out the necessary research and propaganda and to attend to matters like levelling of land, seed multiplication, supply of fertilizers, seeds, pesticides, demonstrations and propaganda, etc., within the command of the projects.

Sustained progress in irrigated agriculture needs constant watch, review, and coordination at various levels. This is attempted by the formation of Boards and Committees, a number of which have already been formed.

Water Charges

As mentioned above, the present-day practice in almost all the States is to charge for water in the form of water rates. These water rates are based on the type of crop and are usually charged on acreage basis in various forms, *e. g.*, specific water rate, consolidated assessment, rate on agreement, etc. With the rising prices, the costs of projects have risen appreciably. In general, the capital cost per acre of supplying irrigation water varies from Rs. 400 to Rs. 1,000 and over per acre. It is evident that no dry crop can bear the servicing charges of such costs. The new irrigation projects would not, by and large, pay for themselves on a commercial basis. It is, therefore, that the benefit-cost ratio concept for the acceptance of projects has gained ground.

On the other hand, it is noticed that the water charges have not kept pace with rising incomes from irrigated agriculture. While it is accepted that irrigation projects cannot pay their way on the basis of water rates, it is necessary that these should be periodically revised, so that the Government gets a reasonable share of the increased income of the users of irrigation facilities. Also in order that Government may share in the ownership gains which accrue to the farmers on the advent of irrigation projects a certain levy should be made towards the capital cost of the project.

Irrigation projects are financed from public funds. Individual users are greatly benefited by them and it is but fair that they should contribute to the community a reasonable share of the gains. While, therefore, irrigation projects may be accepted on the basis of the overall benefit to the community, it is necessary that the revenues therefrom must be optimised by the Government taking a reasonable share of the benefits accruing to the users. Without optimising such returns it would not be possible to undertake such projects on a continuing basis.

Augmentation of Irrigation Facilities

As the surface water resources cannot meet the full demand in the command it is necessary to augment supplies, wherever

possible. This is possible in certain locations, from underground water sources.

It is, however, necessary that a judicious investigation should be made in irrigation commands of deep underground water reservoirs as well as where the sub-soil water-table tends to approach the ground level. These underground supplies could then be tapped by shallow wells or deep tube-wells and the water used to supplement the surface availabilities. Commonly at present dug wells and tube-wells are being constructed by private owners and the Government. In the U. P. and the Punjab a large number of Government owned tube-wells are in operation.

Private wells and tube-wells within canal commands have presented management problems, as there is a tendency on the part of cultivators to mix canal and well supplies to the detriment of Government revenues and leading to a reduction of accountable canal supplies.

The best course is to consider all the surface and deep sub-surface (*i.e.*, tube-well) supplies within canal commands, as Government property and for the Government to integrate the two and develop an integrated system. In such an integrated system, the water rates could be uniform, irrespective of where the supplies come from, and the control retained by Government, thus obviating chances of misuse and difficulties.

In the present context of shortage of food there are other possibilities of schemes which can be quickly executed and harnessed. For example, lift schemes can be undertaken on rivers with available flows, lakes, drainage channels and the like. The usual difficulty in such cases is the heavy operational costs which the owners and even the State Governments find hard to meet. It is only on cash crops like sugarcane, that such schemes can pay. The Central Government has, however, advised the States to consider the possibilities of such schemes on a crash programme basis in order to help production of more food. Such schemes would need pumps, pipes, electricity (diesel pumps are much more expensive to operate), transmission lines, water channels, etc., which are not available in all locations. Their

operational costs range from Rs. 25 to Rs. 100 per acre or more.

The schemes would mainly be owned by individuals who would find the capital and servicing charges a very heavy burden specially if only food crops are grown. The burden would be heavy even for the State, if they were to finance, and maintain such schemes. In their very nature, therefore, such schemes would be for a temporary period, except, where the owners instal them for the more paying crops on a permanent basis.

CONCLUSION

Indian agriculture, by and large, is still traditional. The recurring food crisis, however, have led to a stress on modernisation of agricultural practices. Irrigation is the primary output in modern agriculture, and its aim would continue to be to supply water to crops as and when needed. Thus, improvements to the present practices and procedures are called for in order to make this service more exact and efficient. The possibilities have been indicated at relevant places in the paper; the important ones are summed up below:

- (1) Hydrology forms the very basis for the scientific development of water resources. It is, therefore, necessary to streamline the arrangements for hydrological observations like rainfall, river flows and floods. It is for the Centre to set up a number of key stations, to collect and make available the requisite data at important points and act as a check on the observations at the stations maintained by the States.

The organisations in this behalf should be permanent and not retrenched or reduced, even under the most difficult financial situations.

- (2) The irrigation projects must be as economical as possible. For this purpose, sufficient investigations are needed. There should be a permanent set-up in each State to carry out the necessary detailed investigations, planning and design of irrigation projects.

Enough funds should be provided and sufficient time allowed for such investigations.

Time, money and effort spent on proper and detailed investigations will lead to more realistic estimates of possibilities, construction schedules and financial costs.

- (3) The control of the supply, regulation and use of water should be functional and within the purview of the Irrigation Department. This would entail complete control of the supply of water at the outlet to the cultivators, the use or misuse and wastage of water, the measurement and of demand assessment for different crops and other factors.
- (4) It would be advisable to consider the surface and sub-surface water resources within canal commands as within the purview of the Irrigation Departments. Their developments should be its responsibility.
- (5) For the optimum use of water resources, basin-wise planning becomes a must. It is also necessary to devise machinery for the quick disposal of water disputes and the allocation of waters of inter-State rivers.
- (6) The number of projects under construction at any one time in any State should be related to the amount of allocable finances and the policy should be to complete projects in batches rather than to spread thinly the available finances.

Where benefits can be achieved by splitting a project to be completed in stages, it should be done.

- (7) Funds for important projects should be earmarked on a long-term basis, say, for a whole Plan, rather than by annual allocations. Priority should also be given in the allotment of foreign exchange and supplies of key-materials for such important projects.

- (8) The benefit-cost ratio criterion, should be adopted for the acceptance of projects. All the same, however, it is necessary to optimise Government revenues from the projects by way of betterment levy and periodically reviewing and increasing the water rates in such a way as to ensure the Government getting a reasonable share of the income to the cultivator from the crops raised.
- (9) Irrigated agriculture should be considered as an integrated whole. For this purpose, it is necessary to attach/appoint high-level Agricultural Officers with supporting staff in Irrigation Departments of States for the "progressing" agriculture in irrigated areas.
- (10) Continuous experiments are necessary for ascertaining water requirements of crops in different soil-climate complexes and with various inputs so as to obtain optimum agricultural production per unit of water; and
- (11) Demonstration and propaganda through efficient extension agency are necessary follow-ups for taking agricultural science to the field.

SOIL CONSERVATION PROGRAMMES (1950-65)

N. PATNAIK

THE IMPORTANCE OF SOIL CONSERVATION

Agricultural productivity requires the protection of the soil from erosion which is caused by different natural agencies such as water, wind and gravity. India is a tropical monsoon country and torrential rains wash away surface soil particles. In consequence, the soil loses fertility and the physical loss of soil is beyond recovery by any means. When the landscape is criss-crossed with huge gullies and ravines or sand dunes or debris-cones of landslides, the result is the utter destruction of the land. When it is remembered that an inch of soil takes about a thousand years to form under favourable conditions, the importance of soil conservation measures is obvious.

Soil conservation measures are also essential to watershed management. Every inch of land is part of a watershed for some flow of water. The use and management of watersheds determine the quality, quantity and regularity of water flows in streams. The importance of watershed management came to be realised, only of late, when silting problems became alarming in some of the reservoirs of costly multipurpose river valley projects. There are twenty-five river valley projects in the country on which there has been a heavy investment of public funds. If the catchment areas of these projects are not properly managed, the result will be heavy silt loads in stream flows which will reduce the utility of the projects and their life span.

The reclamation of cultivable wastelands lying unproductive due to salinity and alkalinity or water-logging etc., is an aspect of soil conservation. Rough estimates show that about 100 lakh acres are under saline and alkaline soils, about 60 lakh acres under

coastal saline land and nearly 30 lakh acres suffer from water logging with varying heights of the water table. In view of the scarcity of cultivable land and the desperate need to increase food production in the country, a programme for the reclamation of wastelands is of great importance.

THE SOIL CONSERVATION PROGRAMME OF THE PLANS

The First Five Year Plan sketched a policy and indicated the principal steps to be taken for regulating land use and preventing soil erosion. The policy has been carried further in subsequent plans. The measures suggested are :

- (1) regulating land use with reference to land use capability, *i.e.*, putting good lands to intensive crop raising and others to less intensive use under grass or trees;
- (2) afforestation and preservation of forests through scientific management;
- (3) improvement of land use practices on farm lands such as contour farming, strip-cropping, proper crop rotation and fertilization, and
- (4) adoption of engineering measures like bunds, terraces, check-dams, water disposal systems and gully-plugging.

The research, social over-heads and demonstrations needed for a soil conservation programme received their due attention. The Plan suggested the enactment of soil conservation legislation providing for: (i) powers to execute specified improvements on the farmers' fields and the sharing of the cost between farmers and States, (ii) co-operatives of farmers for executing soil conservation works, and (iii) powers to declare specified areas as protected areas to save large tracts from erosion, floods, silting and dessication.

The Plan proposed the constitution of land utilisation and soil conservation boards at the Centre and the States. The Central organisation was to (i) make an assessment of erosion problems on the basis of reconnaissance surveys, (ii) frame a national policy for erosion control and soil conservation, (iii) coordinate programmes of soil conservation in the river valley projects in the States, (iv) organise and guide Central research institutions,

soil conservation demonstration and soil survey organisations, and (v) undertake publicity and training. The functions of the State Boards were: (i) assessment of the problems of erosion by reconnaissance surveys, (ii) preparation of plans for the control of erosion and soil conservation, (iii) drawing of suitable legislation for the execution of the programme, (iv) execution of plans and measures through appropriate committees and with aid to cultivator, (v) promoting the formation of soil conservation associations, and (vi) framing suitable programmes of research, training of personnel, demonstration and publicity.

ADMINISTRATIVE MACHINERY

Soil Conservation Boards have been set up at the Centre (1953) and in all the States except Assam and Bihar to coordinate the work of the various executive agencies. In Madhya Pradesh, Madras, Kerala, and Uttar Pradesh, these Boards are also responsible for execution of soil conservation schemes. Soil conservation laws have also been enacted in all the States except Assam, Bihar, Orissa and West Bengal. These laws provide for the preparation and execution of schemes of: (i) conservation and improvement of soil resources, (ii) prevention and mitigation of soil erosion, (iii) protection of lands against damage by floods or drought, and (iv) reclamation of wastelands. Actual work has started on a few of the items of the exhaustive list provided for in the Acts such as bunding and terracing, reclamation of wasteland, afforestation, etc. The extensive legal powers of soil Conservation Act have remained largely unused.

The Union Ministry of Agriculture, through the Central Board of Soil Conservation, coordinates the implementation of the schemes of the States. The Secretary (Agriculture) with the Soil Conservation Adviser administers the Central schemes and looks into the progress of State schemes. The District Development Committees attend to the schemes of land development and soil conservation at the district level. In almost all the States, the Director of Agriculture is responsible for soil conservation programmes relating to

agricultural land and the Chief Conservator of Forests in regard to forest land under the administrative control of the State Secretariat.

FINANCE

With regard to the financing of soil conservation programmes, the Government of India bears the full expenditure incurred under Central or Centrally sponsored schemes such as research, training, survey, dry farming demonstrations, programmes of soil conservation in river valley project areas, etc. The Central Government assists State Plan schemes of soil conservation through loans and grants. During the First and Second Five Year Plans the Central Government gave grants which ranged between $12\frac{1}{2}$ to 100 per cent of total cost of schemes.

Under the Third Five Year Plan the pattern of Central assistance was modified as follows :

- | | | |
|---|-------|---|
| (1) Strengthening soil conservation organisation | | 50% grant |
| (2) Research, Training and Survey | | 50% " |
| (3) Soil conservation in agricultural land, afforestation and pasture development | | 25% (Centre $12\frac{1}{2}$ %, State $12\frac{1}{2}$ %) |
| (4) Soil conservation in hilly areas | | 50% loan |
| | | 50% subsidy. |
| | | (shared by Central and State Governments) |

In Maharashtra, Mysore, Gujarat, Madras and Andhra Pradesh $33\frac{1}{3}$ per cent of the total cost incurred on material and labour for soil conservation work was added up as establishment charges while computing the total cost. Of this total cost 25 per cent was given as subsidy and the rest was treated as loan to the cultivators at an annual interest of $4\frac{1}{2}$ per cent. In other words, the subsidy given by the Government covered in fact only the overall establishment charges rather than the actual cost of work and the aid given was in practice a book adjustment.

It should be noted that detailed planning and implementation of the programmes fall within the jurisdiction of the States. The Union Government's role is one of planning, coordinating and financing the programmes. The Centre undertakes the evaluation of the programmes. During the period of the three Five Year Plans the Centre took the responsibility of giving professional training to officers and assistants.

PLANS AND PERFORMANCE

The progress of soil conservation and allied measures under the three plans has been studied. Summary tables showing the expenditure incurred and the extent of the programme executed during the three plans are given below:

Table showing expenditure incurred
and targets achieved during I, II, & III Plans

*(a) Expenditure incurred**

Plan	Expenditure incurred Rs. in Crores.	% of the total Agricul- tural Sector
First	1.6	1
Second	18.0	7
Third	78.0	11

*(b) Achievements**

Schemes	Area First Plan	covered in Second Plan	acres (Lakhs) Third Plan
A. Central Schemes			
1. All-India Soil and Land use survey	—	139.00 125.00	108.00 125.00
2. (a) Central Research & Training Centres (including Jodhpur Institute for 1st Plan only)	8 Nos.	9 Nos.	9 Nos.
(b) Personnel trained	250	1070	1402

Schemes	<i>Achievements in lakhs of acres</i>		
	First Plan	Second Plan	Third Plan
B. Centrally sponsored schemes			
3. Soil Conservation in River Valley Projects	—	—	7.64 7.64**
4. Pilot demonstration project —do—	—	6 Nos.	—
5. Dry farming demonstration projects.	11Nos.	10 Nos.	0.44 (0.45)
6. Survey of Ravineland	—	—	9.20 (12.32)

C. State Plan Schemes

7. Bunding & Terracing (Agriculture Land)	7.00	24.73 (20.00)	93.20 (110.00)**
8. Afforestation & Pasture Development	100.00 sq. m.	4.42 (10.00)	7.00 (7.00)*
9. Ravine Reclamation	—	—	0.39 (0.36)**
10. Reclamation of saline alkaline and Water-logged area	—	—	1.00 (2.00)*

(**Figures in brackets give target)

- Sources:— 1. Report of the Working Group for the formulation of the Fourth Plan proposals on "Soil Conservation, Department of Agriculture, Ministry of Food, Agriculture, Community Development & Cooperation.
2. Information provided by Economics and Statistics Directorate, Ministry of Food and Agriculture, etc.

It will be seen that the expenditure incurred on the programmes increased from plan to plan. Figures given in the table (b) reveal that the major programme consisted of the schemes for bunding and terracing agricultural land which covered about 93.20 lakh acres against a target of 110 lakh acres in the State Plans. Afforestation and pasture development achieved a target of 7 lakh acres in the Third Plan. Soil survey and soil conservation in River Valley Projects exceeded or achieved the target acreage. There was, however, a short-fall in the State Plan schemes of reclamation of saline, alkaline and water-logged areas as well as in the Centrally sponsored schemes of dry farming demonstration and survey of ravine land. As against 250 trained during the First Plan and 1070 during the Second, the personnel trained under the Third Plan was of the order of 1402. The achievement of the physical targets was satisfactory at the end of the Third Plan. The increase in agricultural production and the control of erosion due to implementation of the programme have not been reported on quantitatively.

CRITIQUE OF THE PROGRAMME

The Working Group on soil conservation in the Fourth Plan, Ministry of Food, Agriculture, Community Development and Cooperation, Government of India, has rightly observed that misuse and waste of soil and water resources are due to various reasons such as exploitative cultivation, wrong agricultural practices, injudicious water used, etc., in the arable land and indiscriminate felling of trees, over grazing, shifting cultivation, and indiscriminate quarrying in forest and non-agricultural land. Soil conservation, being a functional programme for increasing production, should aim at the prevention of soil and water waste, control of land deterioration through anti-erosion measures and building up a productivity by adopting various practices to suit agricultural or forest land. The programme has to be a mass action programme since millions use the land. The conclusions of the Working Group on the

planning, implementation and performance under the three Five Year Plans are briefly stated below :

- (1) There is no coordination among the various agencies engaged in implementing soil conservation programmes and no integrated plan on land and water development on a water-shed basis.
- (2) There is paucity of trained personnel for planning and executing the programmes.
- (3) Absence of approved national standards for planning and execution of the technical work creates difficulties in matters of technical scrutiny and evaluation.
- (4) The Central Organisation is not strong enough for initiating and carrying out strong country-wide soil conservation programmes.
- (5) Administrative and financial difficulties also contribute to the slow progress of work.
- (6) There is lack of effective participation on the part of the people.
- (7) The action programme is not backed by commensurate programmes of research, training and demonstration.

During the Fourth Five Year Plan the Working Group proposes to cover 200 lakh acres with soil conservation measures using the water-shed as the unit. This programme will replace counter-bunding and dry farming in agricultural land and afforestation and pasture development in non-agricultural areas. The schemes of irrigation, water management and field drainage will find a place under the plan for the first time. The levelling of land, alignment of field channels, field drainage and proper water use are proposed for an area of 15 lakh acres. Programmes of soil survey, research and training necessary for the above schemes form part of the scheme. A total outlay of Rs. 275 crores has been proposed. In the draft outline of the Fourth Five Year Plan, Rs. 218 crores, *i.e.*, about 11.2 per cent of the total outlay on agricultural programmes have been set apart for soil conservation. It is estimated that this will benefit

200 lakh acres. About 1550 technical officers and 8300 assistants will be needed to implement the schemes.

The Working Group has also given the Fifth Five Year Plan projections. It is anticipated that the Fourth Plan when implemented will build up technical potential capable of annually executing all field plans covering an area of about 14.9 lakh acres. Also a built-up survey potential will be available to take up additional load of soil survey covering nearly 10 lakh acres annually. In the Fifth Five Year Plan, it is projected that emphasis will be laid on water use management, reclamation of saline and alkaline soils, and soil conservation in river valley projects. Having developed the technical potential in the Fourth Plan, the Fifth Five Year Plan envisages field programmes covering an area of 500 lakh acres and soil survey covering 650 lakh acres.

It will be seen that during the first two Plans, organisational facilities were built up and anti-erosion measures like bunding and terracing were taken up. Emphasis was also laid on training of technical persons to man the programme. In the Third Plan, soil conservation work in the catchment areas of river valley projects was executed in isolation without coordinating them with other measures for increasing production. Programmes for reclamation of ravines, saline and alkaline soils and water-logged areas have so far not made any headway. For the first time, programmes of irrigation and drainage are included in the draft Fourth Five Year Plan. The soil survey programme has not yet made any impact on the soil conservation programme. Adequate stress has not been laid on the research programmes in connection with soil conservation. Not much has been done in the past to improve the efficiency of the staff. In-service professional training must be given to them. The contents of training must be broad-based and be also more specific for field jobs. The total requirement of trained personnel is estimated at 1550 senior staff (officers), 8300 junior staff and 24000 field technicians. The existing training programme will not be able to meet this demand.

COORDINATION

Various departments are responsible for the administration of the programme at different levels. This requires coordination among the various agencies. The weakness in inter-agency coordination has been pointed out by the Programme Evaluation Organisation of the Planning Commission, the high level team on agricultural production sponsored by the Ford Foundation and the three membered T.C.M. consultant group on land and water resources in India. The diffusion of programmes due to lack of coordination, results in diffusion of personnel and resources as well as responsibility. The pattern of financial assistance adopted apparently for administrative convenience does not encourage the adoption of new practices. There is no provision for financial compensation to meet probable losses due to the adoption of new practices, re-adjustment of land use, etc. This provision is specially important for critically eroded areas and catchment of river valley projects. The Programme Evaluation Organisation of the Planning Commission, in its Study Report, 1962, has pointed out that the block agencies in most States did not succeed in preparing the people to undertake soil conservation nor in carrying out the necessary follow-up action. In the majority of States, Panchayats and Cooperatives have not been associated with the programme of soil conservation. In a few States, Panchayats have been used to persuade the land owners to adopt soil conservation measures but have not been assigned a positive role in the field of execution. In Maharashtra alone farmers' unions have been formed for planning and executing a bunding programme. Soil conservation programmes in the field have not yet become a people's programme and much needs to be done through extension. Extension workers have to be well acquainted with social-psychology, communication processes and extension methods to be able to make an impact on farmers. In regard to some other aspects of the programme, *e. g.*, planning and evaluation, it is observed that planning at the lowest level, in practice, merely consists of plan targets and allocation of resources handed

down by the higher levels of the administration. There is a lack of local planning in which cultivators themselves are involved. It should be emphasised that plan which are not accepted by the land users will hardly yield any results. Similarly to plan activities which the cultivators would, in any case, undertake is a waste of effort.

An agricultural programme including soil conservation involved a variety of factors and when all the factors are at their optimum, the programme yields the desired results in production. Because of the time lag between a programme and its results, continuous research and an evaluation study of a specific project is necessary to arrive at valid conclusions. Such studies and the technical evaluation of the soil conservation programmes, their organisation and implementation will have to be intensified. Evaluation studies should also show how economic principles can be applied to the problem of soil conservation and agricultural production. In carrying out an evaluation of any programmes, specific statements of precise objectives and analytical procedures will yield realistic results.

FUTURE PROGRAMME

In formulating the draft Fourth Five Year Plan proposals on agricultural development, resource area approach has been rightly kept in view. According to this, there will be a minimum programme of development all over the country, with a provision for special programmes for selected areas. It is proposed to demarcate the potential resource areas and indicate the type of programme to be undertaken in such areas. The soil and water conservation programmes should be integrated with the above programme in order to step up the production drive. The immediate and long term programmes for the future are suggested below :

Immediate

- (1) Soil conservation measures should be integrated with the package practices for increased agricultural production.

- (2) Costly schemes like the reclamation of ravines, saline and alkaline soils, etc., should be taken up only after thorough technical investigations.
- (3) Programmes of irrigation and drainage should include result demonstration and on-the-farm technical assistance.
- (4) Emphasis should be laid on soil survey programmes.
- (5) The Central Soil Conservation Research Centres should collect basic data on efficiency of practices by taking up field studies in collaboration with the States.
- (6) Under the overall control of the State Government, the Director of Agriculture should be in charge of integrated State programme and the District Agricultural Officer should be incharge of the district programmes. All technical staff should be free from other functions so that they can devote their full time for technical work.
- (7) The responsibility of supplying service items should be transferred to cooperatives and financial aspects of the programme to rural credit organisations.
- (8) Shorter "on-the-job" courses of two to four weeks' duration must be conducted at the Centre and in the States for the training of personnel. To facilitate such training, approved technical standards and specifications for technical practices adopted in different regions should be followed.
- (9) Financial compensation to meet any loss due to soil conservation measures and land adjustment should be provided to attract land users for the programme specially in water-sheds of River Valley Projects.
- (10) There should be close coordination between the Centre and the States with regard to agricultural field programmes. This can be effected by the Extension Directorate under the Ministry of Food and Agriculture.
- (11) The cultivators can be geared to this programme

through result demonstration, training camps for village leaders and young farmers, mass media and visual aids.

- (12) The Agricultural Universities must undertake programme research and evaluation with regard to agricultural development plans.

Long Term

- (13) The Centre should take up the work of preparing a national inventory of soil and water resources of the country in order to develop long-term resource planning for different regions.
- (14) Key village plans or farm plans should be executed and assessed at every stage so that they can be used as Bench Marks while evaluating programmes in the area.

A comprehensive programme of soil and water conservation on a water-shed basis integrates all major practices from agricultural sciences, forestry and engineering. Such a technical programme, when properly executed, will conserve our soil and water resources which are basic to the success of agricultural production programmes in the country.

FERTILIZERS

M. SUBRAMANIAM

Fertilizer Use in India during First and Second Five Year Plans

The earliest reliable figures of fertilizer supply in India are available only from the year 1946-47. In that year the supply amounted to 35,000 tons N, 4,000 tons P_2O_5 and 1,800 tons K_2O . This can be taken as an indication of the general level of consumption at that time. By 1950-51 consumption rose to 55,000 tons N, 8,000 tons P_2O_5 and 6,000 tons K_2O . The first Five Year Plan laid emphasis on the various measures required to stimulate agricultural production. Fertilizers thus assumed a major importance in planning for agricultural production. It was assumed that at the end of the First Five Year Plan consumption of fertilizers would rise to 1,76,000 tons N and 68,000 tons P_2O_5 . As against this, however, the actuals achieved by 1955-56 were 1,22,000 tons N and 14,000 tons P_2O_5 . The supply of potash in 1955-56 was estimated to be of the order of 12,000 tons. This gradual growth of consumption continued during the Second Plan period. But as against the target of 37,000 tons N, 1,20,000 tons P_2O_5 and 30,000 tons K_2O , the consumption achieved was only 2,10,000 tons N, 70,000 tons P_2O_5 and 26,000 tons K_2O by the end of the Second Plan. In the case of Nitrogen, one of the reasons for the shortfall in consumption was stated to be the non-availability of fertilizers. In the case of P_2O_5 , however, the demand continued to be well below the production capacity in the country.

Fertilizer Use during the Third Five Year Plan

By the time the Third Plan was being formulated, the importance of fertilizers was recognised to such an extent that

N —Nitrogenous fertilizers.

P_2O_5 —Phosphatic fertilizers.

K_2O —Potassium fertilizers.

much higher targets both for production and consumption were considered necessary. Targets of 1.0 million tonnes N, 0.4 million tonnes P_2O_5 and 0.2 million tonnes K_2O were prescribed in the Third Five Year Plan. The Plan also aimed at the establishment of sufficient production capacity in the country to meet the requirements of both nitrogenous and phosphatic fertilizers. After the mid-term appraisal, the targets underwent a revision. The revised targets were 8,00,000 tonnes N, 2,50,000 tonnes P_2O_5 and 1,50,000 tonnes K_2O to be achieved in 1965-66. While consumption continued to be well below the targets, the growth of fertilizer consumption during the Third Plan period is significant as indicated by the following figures :

Year	Consumption (in '000 tonnes)		
	N	P	K
1961-62	250	60	28
1962-63	333	83	36
1963-64	377	116	51
1964-65	555	140	69
1965-66*	547	132	78

*Draught year.

Factors Affecting Growth of Fertilizer Use

Some of the factors contributing to this growth of consumption are :

- (1) Introduction of the package of agricultural practices under programmes such as the IADP and the IAA.
- (2) Price reductions offered for certain types of fertilizers like calcium, ammonium nitrate and urea.
- (3) The rising trend of grain prices. From 1964-65 onwards there is a noticeable trend towards a rapid increase in fertilizer consumption. Up to the end of the Third Plan, however, the emphasis on the use of nitrogen continued. The intensity of fertilizer consumption in the southern

states was relatively higher and this is attributable in part to organised sales promotion work by distributors.

Fertilizer Needs in the Fourth Plan

In the agricultural production plans under the Fourth Plan, special attention will be given to areas which are irrigated or have assured rainfall. An area of nearly 40-50 million acres moreover is expected to be covered by seed varieties which require fertilizer application at very high levels. The Committee on Fertilizers has pointed out that a production programme which is intended to bring self-sufficiency in food production and to increase the production of cash crops will require very large quantities of N, P and K. The application of fertilizers per acre, even though it is very low at present, will have to be brought up to the recommended levels at least in the areas which will be covered by intensive production programmes in the Fourth Plan. The requirement of fertilizers for the period up to 1970-71 as estimated by the Committee on Fertilizers (which has since been accepted by the Government of India) is indicated below :

Fertilizer Consumption Targets in the Fourth Plan (figures in million tonnes)

Year	Nitrogen	P ₂ O ₅	K ₂ O
1966-67	1.00	0.370	0.20
1967-68	1.53	0.500	0.30
1968-69	1.70	0.650	0.45
1969-70	2.00	0.800	0.55
1970-71	2.4	1.000	0.70

Fertilizer Production in the Third Plan

Regular and adequate supplies of fertilizers are of great importance to the greater use of fertilizers in agriculture. At present a substantial part of our requirement is being met from

imports. Imports, by their very nature introduce an element of uncertainty in the supply. Dependence on imported fertilizers is incompatible with any long term programme for agriculture. The programme for production of fertilizers within the country assumes, therefore, great importance. As against the target of indigenous fertilizer production in the Third Plan which was 8 lakh tonnes N by 1965-66, the actual production during that year was of the order of 3 lakh tonnes N and 1.5 lakh tonnes P_2O_5 .

Administrative Aspects of Fertilizer Production Programme

In order to ensure the availability of fertilizers from indigenous production at the levels assumed, it will be necessary to avoid administrative delays in the light of our experience in the Third Plan. Improvement in the administration of indigenous production of fertilizers will be particularly called for in the following directions :

- (1) The production in the factories will have to be maintained at a level higher than 80 per cent of the capacity. The factors that have inhibited production must be identified and specific action taken to remove them.
- (2) The period for the completion of fertilizer factories should not exceed normally 3 to 4 years. The Committee on Public Undertakings has adversely commented on the delays in setting up fertilizer factories by the Fertilizer Corporation of India, which took 5 to 6 years for their completion.
- (3) The machinery for taking decisions in relation to fertilizer projects should be so organised that quick decisions would be forthcoming in matters like product pattern, terms of collaboration, foreign exchange etc. Some of the delays which were noticed by the Committee on Public Undertakings relating to the working of the Fertilizer Corporation of India were attributed to lack of timely decisions on vital issues. The Government of India has now authorised a Committee of Secretaries to decide such

issues and this should contribute substantially to the elimination of such delays.

- (4) Licensed capacity must be sufficiently in excess of the proposed target of production, because it is natural that some of the projects may not come into production by target date due to unforeseen initial difficulties. As the Government of India has accepted the target of consumption of fertilizers of the order of 2.4 million tonnes N, the firmly licensed capacity should be increased to well over 3 million tonnes N.
- (5) On the basis of well organised agronomic studies the types of fertilizers that are needed in particular areas should be well settled so that fertilizer factories that are contemplated can fix their product pattern, on a firm basis and would have no difficulty in popularising their products in their areas of operation.
- (6) Fertilizer technology should always keep pace with the needs of the situation and in particular the Indian fertilizer industry should take steps to ensure that suitable technological processes are adopted keeping in view the present shortage of sulphur.
- (7) Adequate arrangements must be made to ensure the availability of raw materials like rock-phosphate and sulphur as well as other requirements like power and water supply for the factories in production.
- (8) The cost of production of fertilizer in existing units in India being relatively high, it is necessary that the measures for achieving all possible reductions in the cost of production are continued. These are :
 - (i) efforts to maintain production up to atleast 90 per cent of capacity;
 - (ii) planned expansion of capacity;
 - (iii) reduction in establishment charges; and
 - (iv) better inventory management.

Fertilizer Imports

Requirements of imported fertilizers must be assured on a term basis by assigning adequate priority in the release of foreign exchange, particularly because these requirements are substantial. The foreign exchange requirements would be about \$ 350 million per year, until a reduction in imports becomes possible on account of new large indigenous units coming into production. The import programme for fertilizers has to include not only fertilizers in straight form but also adequate quantities of complex and phosphatic fertilizers for the following reasons :

- (i) Unless the supply of phosphatic fertilizers is adequate, the one sided growth of the use of Nitrogen might be harmful to the development of agriculture.
- (ii) Unless large quantities of di-ammonium phosphate or nitrophosphate, as the case may be, are imported to familiarise the cultivators with the use of new high analysis complex fertilizers before large scale production of such fertilizers starts around 1970, the new units might run into selling difficulties.

Administrative Aspects of the Fertilizer Import Programme

The volume of fertilizer imports has been considerable from 1966-67 as indicated below:

	1966-67	1967-68	1968-69 (Proposed)
	(figures in '000 tonnes)		
N	617	900	1040
P	141	360	230
K	147	296	200

The handling of an import programme of this magnitude involves a complex of administrative procedures and would call for the utmost vigilance and adequate administrative arrangements to ensure a smooth flow of the imported fertilizers to the

farmers. Some of the administrative arrangements essential for this programme are :

- (a) allocation of foreign exchange in advance;
- (b) initiation of procurement action in time;
- (c) planned shipment programme;
- (d) adequate handling facilities at ports;
- (e) sufficient wagon allotment for movement by rail;
- (f) adequate warehousing facilities at ports and other strategic locations.

Apart from the assurance of the necessary physical requirements this programme calls for administrative efficiency in two directions; firstly, complete coordination between the various agencies involved has to be ensured so that unforeseen bottlenecks do not arise; secondly, the critical factors and the time element involved will have to be adequately taken care of by proper programming and evaluation.

Fertilizer Distribution Arrangements

The success of the programme of fertilizer distribution depends on the adequacy of the arrangements at various stages of distribution and consumption. In a study made of the problems of coordination in agricultural programmes, the Programme Evaluation Organisation of the Planning Commission (P.E.O.) divided the arrangements for fertilizer distribution and use into four stages namely :

- (1) Formulation of targets
- (2) Distribution arrangements
- (3) Facilities provided for fertilizer use
- (4) The use of fertilizers by the cultivators.

Assessment of Requirements

The assessment of fertilizer demand and formulation of targets for each State, District and Block is of significance to the region's agricultural development. Otherwise there will be either a shortage of fertilizers on account of under-assessment of

the demand or a large volume of carry-over stocks on account of over-assessment of requirements. The technique of formulation of targets particularly at the district level, is of importance because of the general tendency on the part of the Departments of Agriculture in the States to assume a higher target of consumption while the distribution agencies, who are in charge of placing the actual indents would generally under-estimate the requirements on account of their normal tendency to play safe. The study made by the Planning Commission reveals that failure to have a coordinating agency responsible for planning indents can have adverse effects on the availability of fertilizers.

Need for Estimating Fertilizer Demand in Relation to Crop Requirements and Local Conditions

It was found in a number of States that the targets of consumption for each block or district are not fixed on the basis of the local experience but they are merely indicated as a break-up of the total target fixed for the State. The P.E.O.'s study has pointed out how in many cases the district indent was not found to be based on the requirements communicated by blocks. If requirements are estimated without any regard to the local experience, there are chances of short-falls in supply or in consumption. There are also instances where the estimates prepared and the indents placed by the distributing agencies, bear no relation to the requirements and the targets prescribed by the Block Development Officer or the Agricultural Department. The P.E.O. study also refers to the fact that although production plans for members of cooperative societies are prepared, they are not made use of in the implementation of the fertilizer programmes.

Association of all concerned Agencies in Formulation of Targets

It is generally seen that a more realistic assessment is made when the indents are prepared by district Committees of officers representing the Community Development, Agriculture and Co-operative Departments and other agencies incharge of distribution. In some States, the Panchayati Raj institutions like Panchayat

Samitis and Zila Prishads are also associated with this process. While it is true that realistic estimation of requirements is possible when all these interests are represented in a district level committee responsible for planning indents, there were instances where such a procedure was not operated with the earnestness with which it should be handled. It was observed during the P.E.O. study that while in Maharashtra, Andhra Pradesh and Punjab coordination of this type existed there were instances where the supplies made by the cooperative agency did not come up to the estimate of demand given by the district level agency. Again, rigidity in these procedures may itself act as an impediment to a proper estimation of the demand which should have an inherent element of elasticity. In some areas the insistence on an intimation from the authorities before the distributing agencies lift the fertilizer stocks and the planning of allotments solely on the basis of area under different crops and recommended levels of application without reference to the carry-over stocks left with the distributing agencies is reported to have led to difficulties that could have been avoided if the distributing agencies had been associated with the assessment of demand in a more realistic way.

Assurance of Supply for Special Programmes and Adequacy of Buffer Stocks

The Committee on Fertilizers has stressed the need for the advance planning of supplies by States on the basis of their seasonal and monthly requirements with reference to their crop pattern. Such planning will also have to make allowance for unavoidable delays in supplies on account of bottlenecks in transport and non-arrival of anticipated supplies from abroad. The Committee has, therefore, stressed the need for having sufficient buffer stocks in storage in advance of the season. The Committee has also stressed the need for assuring supplies to areas covered by special programmes. In planning fertilizer indents, therefore, adequate attention should be paid to the assurance of supplies in the Intensive Agricultural Programme areas so

that the targets of production of various agricultural commodities are actually achieved. Again the planning of fertilizer consumption in each State should take into account the need for balanced manuring and will have to provide for a sufficient use of phosphatic and potassic fertilizers for suitable crops.

Central Fertilizer Pool

At the central level the responsibility for collection of indents and arranging supplies rests with the Central Fertilizer Pool for nitrogenous and complex fertilizers and with I.P.S.A. for potash. The indents on the Central Fertilizer Pool are made annually in advance by the State Governments and the Plantation Boards. Allotments of fertilizers to the States and to the plantations are, however, made on a quarterly basis and the fertilizers are actually despatched on the basis of these allotments by the factories or by the Regional Directors of Food (for imports) on receipt of despatch instructions. The allotments are usually made on the basis of the overall supply position with due reference to the fertilizer consumption in the State during the previous year and the agricultural programmes of the State for the current year. The Committee on Fertilizers has pointed out that the existence of multiple agencies for handling, procurement and distribution of fertilizers on behalf of the Central Government, results in a division of responsibility which is hardly conducive to appropriate administrative arrangements being made. The Committee has, therefore, suggested that the responsibility should be fixed at the central level on a single organisation.

Monopolistic Role of Cooperatives in Fertilizer Distribution

Till recently, in the States of Andhra Pradesh, Bihar, Gujarat, Madhya Pradesh, Maharashtra, Mysore, Orissa, Punjab and Rajasthan, distribution of nitrogenous fertilizers was entrusted to cooperative organisations on a monopolistic basis. In Uttar Pradesh, the distribution is done through Cooperative agencies as well as through the Agricultural Department. In West

Bengal, Kerala, Madras, Goa and Pondicherry distribution is undertaken by Cooperatives as well as private trade. In Assam, the distribution was entirely in the hands of private agencies, whereas in Himachal Pradesh, Manipur, Tripura and the Andamans, the distribution is entirely in Government hands. In States like Andhra Pradesh, Maharashtra, Gujarat, Mysore and Punjab, the performance of cooperative agencies in fertilizer distribution has been substantial and the growth of fertilizer use in these States has been maintained. In States like Madhya Pradesh, Orissa, Bihar and Rajasthan, however, where the level of consumption is rather low, the cooperatives have not been able to push up fertilizer sales. In States like Kerala, and Madras, cooperatives have been able to play their role in fertilizer distribution along with the private trade.

Historical Background to Predominance of Cooperatives in Fertilizer Distribution

The marketing of nitrogenous fertilizers is at present predominantly in the hands of cooperative agencies. The position enjoyed by cooperatives as the sole agency for institutional rural credit has to a large measure contributed to their acceptance as retail distributors in view of the close relationship between credit and distribution. In the earlier years before the First Five Year Plan was drafted, there was a recognition of the role of cooperatives and as early as in 1945 the Famine Enquiry Commission for Bengal recommended that Government should arrange preferably through cooperative societies, for the distribution of manures and fertilizers and organise cooperative credit societies, in areas where they do not exist, with a view to financing the small cultivator in the purchase of manures and fertilizers. The Second Foodgrains Policy Committee in 1947 also suggested an organisational set-up based on village panchayats and cooperatives to help in the production drive. Even in the First Five Year Plan, emphasis was laid on the fact that cooperatives can help to increase the effectiveness of the extension work and it was recommended that services

such as supply of seeds, fertilizers and implements which are necessary for agricultural production, can be made available more effectively through cooperatives. The Government of India advised the States in 1953 in pursuance of this policy that the cooperative societies should be utilised for fertilizer distribution to the maximum extent possible. The National Cooperative Development and Warehousing Board in 1957 and subsequently the National Development Council in November 1958 again stressed the need for increasingly greater association of the cooperative agencies in agricultural production and it was proposed that the cooperatives should take over the responsibility for distribution of fertilizers to farmers as well as for the provision of credit facilities to them. The Working Group on Cooperative Policy in 1959 suggested that fertilizer distribution throughout the country should be handled by cooperatives only and stressed that efforts should be made within three years to achieve this objective. The Nalagarh Committee in 1958 also felt that the time had come when the entire organisation for the supply of fertilizers, seeds, insecticides and agricultural implements ought to be separated from the extension and technical functions of the Agriculture Department and transferred to the cooperative organisations in the States. As a result we have the present system of distribution of nitrogenous fertilizers in which the cooperatives have not only a predominant but a substantially monopolistic role in many States.

Expectations from Cooperative Agencies

The cooperatives were given a predominant role in fertilizer distribution on the basis of certain expectations. It was believed that fertilizer distribution would give monetary benefits to cooperative agencies. It was expected that adequate credit will be found for all needy farmers from the cooperative sector enabling the credit agencies to serve almost all the agricultural families in the village. It was also felt that in the remote areas where other agencies were reluctant to open fertilizer depots, the cooperative agencies organised to render agricultural services will be the only channels to reach agricultural supplies to needy farmers.

Shortcomings of Cooperative Agencies

The performance of cooperative agencies in fertilizer distribution has not been up to expectations in many areas for various reasons. On account of the lack of marketing experience of most of the cooperative agencies and on account of inadequate distribution margins, fertilizer distribution has in many cases been a monetary drag on the cooperative system. The volume of credit available from the cooperative sector was also as low as 30 per cent of the total borrowings of rural households with the result that the cooperative agencies could not effectively serve a large number of farmers outside the cooperative fold. Retail agencies from the private trade generally have the advantage of better organisation so that they are able to manage with relatively lower overhead charges and smaller distribution margins. Cooperative depots, on the other hand, generally do not have the advantage of whole time salesman. Cooperative depots do not deal with other commodities in general. Most of the cooperative depots have turnovers of only small quantities and the result has been that fertilizer distribution has proved unprofitable to many cooperative agencies. No cooperative can survive as a marketing organisation unless it makes a reasonable profit on the transaction.

Significant Role of Cooperatives in the Expansion of Supply Points for Fertilizers

In spite of these shortcomings cooperatives have tried to play a useful and expanding role in fertilizer distribution in the Third Plan. A large proportion of the additional depots established during the last few years have been opened in the cooperative sector. Thereby the cooperatives have tried to supply a much needed service. But the general experience has been that the distribution of fertilizers has not always been managed efficiently and remuneratively by the cooperatives, from a purely business angle.

Need for Expansion of Marketing Activities in the Cooperative Sectors

Fertilizer storage and sales form only a part of the service which is required from the agencies dealing with the needs of farmers. Lack of profit or the small profit in inputs distribution can be offset by profits made in the other parts of the business of dealing with the needs of the farmers. The main profit could come from marketing and processing of agricultural produce. Requisites like seeds, pesticides and agricultural implements and, may be other consumer articles, should also be part of the general stock in trade of these depots. If the Cooperative system is to play its rightful part in fertilizer distribution, it should take a more active part in the marketing and processing ventures and also meet the needs of the farmer for requisites like seeds, pesticides, agricultural implements and other necessities. In short the retail cooperative depots should be the outlets that will give the multi-purpose service which has long been the objective of the cooperative movement. The marketing of produce is being linked to credit to a larger extent in some of the States. This development needs to be further strengthened and accelerated. The credit requirements of the farmer for buying his fertilizer and pesticide inputs have to come substantially from the cooperative sector. If full use is not made of this source of credit, either due to the weakness of the cooperatives or due to reluctance on the part of any distribution agency in utilising the cooperatives, pressures on other finances for credit will multiply. This may create bottlenecks in fertilizer distribution. Any good distribution agency should, therefore, take proper note of the availability of credit in the cooperative sector and make use of it to the fullest extent.

Need for Eliminating Monopolistic Role of Cooperatives

In 1962, as a result of a review of the distribution arrangements, State Governments were advised by the Government

of India that where cooperative organisations did not exist or where the cooperatives were weak or unwilling to take up distribution of fertilizers on the contemplated scale, additional agencies may be employed. Fertilizer sales by cooperative agencies will naturally be limited to quantities that can be handled by them with their limited resources. Cooperative agencies themselves feel that they cannot handle the entire quantity of fertilizers that will have to be marketed by 1970-71. The cooperative movement cannot be asked to take responsibility for distributing a greater amount of fertilizer than what can be effectively distributed through their system. In their credit operations the cooperatives are likely to opt for safety rather than take risks in meeting the needs of the people as a whole. This has to be taken note of in the distribution system. In a situation in which fertilizer requirements are much larger than the capacity of the cooperative institutions to handle them, distribution arrangements will have to be strengthened and extended by bringing in other agencies besides the cooperatives into the system. The acceptance of a distribution system in which private agencies are also allowed to work as fertilizer distributors is, therefore, necessary. The removal of monopolies can make available an adequate number of distribution agencies and this will ultimately result in greater efficiency of distribution.

Freedom of Marketing to Producers

In the fertilizer distribution system the package programme approach did provide favourable factors for increased fertilizer consumption. At the same time it appears that the marketing service in general whether in package areas or elsewhere would need considerable improvement physically and organisationally to enable adequate quantities of fertilizers to be supplied at the right time to farmers. While examining the steps that might be taken to improve the distribution system note has to be taken of the pattern of production that would emerge as a consequence of licensing of a number of new fertilizer complexes.

The fertilizer distribution pattern would itself need a substantial re-orientation as a result of the recent policy announcement by Government in regard to the licensing of new fertilizer factories. The decision of Government to permit factories licensed up to December 31, 1967 to organise their own distribution arrangements for their production is of great significance to the emergence of a new pattern of distribution. Thus an increasingly larger volume of fertilizers would be distributed by factories under their own arrangements. The manure mixing industry which has provided a valuable service in promoting balanced manuring would also have to readjust itself in the context of granulated complex fertilizers of different analyses being marketed by new factories. The usual drawbacks in the use of fertilizer mixtures are their high cost and unsatisfactory physical condition. These drawbacks would be substantially eliminated in the production of high analysis granulated complex grades.

Training of Salesmen

In a study of factors affecting fertilizer consumption, the National Council of Applied Economic Research has observed that the quality of the distributive and marketing service did not fully satisfy the farmer, both in the package as well as the other areas. This points to the fact that while a trained extension service is necessary, this by itself cannot be a substitute for an efficient marketing service provided by fertilizer manufacturers or distributors. The only way in which a better service can be provided to the farmer is to give organised training to the salesmen employed in the field regarding their obligations to provide service after sales. The service provided to the farmer cannot be completed unless the marketing arrangement takes adequate care of competitive pricing and proper quality.

Adequacy of Distribution Margins

While it is only fair to expect the distributor to provide the necessary service to ensure continuity of fertilizer off-take, it

is also necessary to provide adequate margin to compensate the distributor for the service rendered by him. Some of the studies noted by the different studies are also attributable to the inadequate distribution margin provided to the distribution agencies and to cooperative agencies in particular. A proper understanding of distribution costs is necessary because the cost of distribution plays an important role apart from the cost of production in determining fertilizer prices. The necessary incentive to the distribution agencies is likely to be available in future for two reasons : firstly, the margins allowed by the Central Pool have themselves been revised following the recommendations of the Fertilizer Committee (1964) ; secondly, in a competitive distribution system, the manufacturer would be able to obtain the services of competent dealers only if he is willing to provide an adequate commission to the selling agencies.

Warehousing and Transport

Two bottlenecks commonly encountered in the distribution arrangements are the inadequacy of warehousing facilities and the lack of timely availability of rail wagons for transport. In view of the seasonality of fertilizer consumption, some amount of buffer storage has to be planned for as pointed out by the Fertilizer Committee. Adequate arrangements regarding transport and warehousing have, however, to be made after a proper study of the existing facilities available in the marketing area and after an estimation of the peak inventory stocks likely to be held with due regard to the cropping pattern. It would be necessary for the distribution agencies and the factories to make a detailed study and to provide for adequate warehousing at strategic locations. With a proper marketing plan it should also be possible for them to enter into advance commitments with the railways for the supply and utilisation of adequate number of wagons for transport of fertilizers in different directions.

Provision of Credit

It was a general observation in all field studies that

availability of credit in time was an important factor that affected fertilizer consumption. Where the cooperative movement is sufficiently effective, it is possible to provide adequate credit for fertilizers under the form plan and to link it with the purchase of the produce. Where the cooperatives have overdues or are organisationally weak, fertilizer credit in kind is not possible and to that extent credit becomes a bottleneck in distribution. The only way in which this gap can be filled is the association of other agencies in the provision of fertilizer credit. Apart from cooperative agencies credit should be provided by fertilizer distributors to the extent possible and this should be supplemented by farm credit made available either by commercial banks or by state agencies. Credit to the distributing agency is itself of equal importance because the provision of such credit can alone enable the marketeer to obtain and hold adequate stocks in off-season. While the Reserve Bank has agreed to provide refinancing in respect of marketing credit required by cooperative marketeers, full use of this source of credit cannot be made unless the cooperative marketing agencies strengthen themselves in such a way as to be able to provide necessary margin money and to meet the other requirements of proper accounting. It is gratifying to see that commercial banks have also come into the field of financing fertilizer marketeers on the basis of re-financing from the Reserve Bank. The position that emerges is that while adequate financing will be available for fertilizer credit, the flow of funds might be hampered due to the reluctance of banking agencies to provide adequate credit to new customers on account of the risk element involved. The only way in which this bottleneck can be removed is to provide a credit guarantee for enlarging the volume of credit facilities made available by the commercial banks. Such a credit guarantee has been recommended by the Fertilizer Credit Committee set up by the Fertilizer Association of India.

Farmers' Response to Fertilizer Use

The most important factor for stepping up the use of fertilizers in agricultural production is their proper application by

farmers to achieve the best results. The P.E.O.'s study has revealed the following problems in relation to fertilizer use by farmers:

- (1) Cultivators' preference for particular types of fertilizer. (This is particularly true of the traditional preference for ammonium sulphate)
- (2) Diversion of fertilizers meant for food crops to cash crops.
- (3) Resale of fertilizers by farmers, who bought them at subsidised rates to other cultivators generally for commercial crops.

In all these cases, the basic reason for mis-use or improper use of fertilizer was the lack of knowledge about the benefits of fertilizer use. Without being convinced that fertilizer use would bring economic benefits to him the cultivator to whom fertilizer was issued did not care to use it properly.

Fertilizer Promotion

The Committee on Fertilizers has emphasised the need for a well organised fertilizer demonstration programme in which emphasis is placed on obtaining results that would carry conviction to the farmer. The Committee has attributed the failures of the demonstration programme to lack of adequate attention to problems relating to the selection of the demonstration field, lack of adequate supervision over the demonstration and the lack of an effort to show demonstrable results, that can be put across in a convincing manner to the farmer. The Committee had, therefore, recommended the establishment of a full time organisation in the form of a Promotion Corporation to provide the nucleus of a trained set-up that would be able to take responsibility for fertilizer promotion throughout the country. Fertilizer promotion has to take into account the need for popularising new fertilizers as well as balanced manuring and should make use of soil testing facilities to an increasing degree. Such promotional work should also give due emphasis to the package of agricultural practices in addition to fertilizer use. While recommending that a sufficient number of individual demonstrations as

well as pilot demonstration projects should be organised, the Committee on Fertilizers has rightly laid stress on quality and results in the demonstration programme so that fertilizers are sold not to unwilling cultivators but to those who have sufficient knowledge of the value of fertilizers in agricultural production in order that the best results from fertilizer use are achieved. The Committee has also stressed the inadequacy of existing extension agencies for the task of fertilizer promotion particularly when they are entrusted with many other items of work in the Community Development Blocks.

Mal-distribution in Situations of Short Supply

To a large extent administrative arrangements for fertilizer distribution in the past were conditioned by the sense of shortage that generally prevailed in respect of fertilizers. On the other hand some of the field studies have revealed that while stocks of fertilizers were kept unsold for long periods in some areas they were not available in other areas where cultivators were willing to pay even higher prices. This is attributable not only to a lack of planning in the indenting of supplies but also to restrictive practices in the distribution system itself. The most effective distribution can be expected only from those distributing agencies which have the freedom as well as the full responsibility for disposing of the stocks entrusted to them. Where the distributing agencies were constrained to sell only on the basis of permits issued by an outside agency the general effect was the accumulation of stocks even though the original intention was to ensure fair distribution by a system of permits. Secondly, where the distributing agency did not have any financial stake and was entrusted with the fertilizer only on a consignment basis, distribution generally suffered due to lack of sufficient incentives for quick clearance of stocks in the distribution system.

The Emerging Pattern and Manufacturers' Increasing Responsibility for Administering Distribution System

The situation is, however, fast undergoing a change as new

factories are going into production and as adequate imports are being arranged. The situation of short-supply of fertilizers would no longer be a conditioning factor in the distribution system. On the other hand the marketing services will have to be organised on the assumption that there will be an adequate fertilizer supply which can be pushed through only if appropriate distribution arrangements are made. The manufacturers and distributors must now be allowed sufficient opportunity to build up an adequate distribution system. It will also be necessary for the manufacturers to prepare themselves in time by building up a network of depots in their marketing area and by providing not only the physical requirements of storage and transport but also the necessary training and supervision for their salesmen. The manufacturers would also have to provide soil testing services and effective fertilizer demonstrations in the field to build up a customer service in relation to the farmer. Increased provision of soil testing facilities and the organisation of fertilizer demonstrations by state extension services would, no doubt, continue as part of the general fertilizer promotion effort, but the provision of some of these services by the manufacturers themselves on a selective basis is a basic requirement of a successful marketing programme. While the monopolistic role of cooperatives is not expected to continue in fertilizer distribution, cooperatives would nevertheless continue to distribute a very large percentage of fertilizers in future also.

Need for Proper Management

Many of the shortcomings in the distribution system are attributable to the absence of adequate management, particularly, in the cooperative marketing field and to the lack of proper training for cooperative managers in regard to aspects connected with fertilizer distribution. Apart from the training programmes which fertilizer manufacturers would be required to organise for their own salesmen, it would be desirable for agencies in charge of training programmes in the cooperative sector, to take adequate note of the requirements of an effective distribution system for fertilizers.

Summary of Recommendations

A realistic estimation of fertilizer requirements of the local area is essential for ensuring adequate fertilizer supply. Such an assessment is possible only if all concerned including the agricultural experts as well as the distributing agencies are fully associated in the formulation of targets.

In the indent of fertilizer supplies adequate attention should be paid to sufficiency of buffer stocks in advance of the season and to the need for balanced manuring with different types of fertilizers.

With due regard to the performance and the capacity of the cooperative agencies in relation to the quantities of fertilizers that are required to be distributed other agencies should be given an equal opportunity to build up an efficient marketing service for fertilizers. Monopolies in the fertilizer distribution field should be eliminated so as to provide healthy competition between distributing agencies in offering to fulfil the farmer's needs.

The quality of marketing service even in package areas was found unsatisfactory from the farmer's point of view. This discloses an urgent need for proper training of salesmen in the fertilizer distribution system, particularly in the cooperative field.

In the context of the freedom of marketing and distribution granted by Government to the newly licensed factories adequate arrangements for training of salesmen will have to be made by the factories themselves.

The programme of popularisation of fertilizer mixtures should be reviewed and re-oriented with due regard to the availability of high analysis complex granulated grades from the newly licensed factories.

The cost of providing a satisfactory marketing service should be adequately provided for in the selling commissions allowed to the distributors.

The physical requirements as well as the economics of transportation and warehousing in the marketing area should be properly studied and adequate warehousing facilities for buffer storage provided. A detailed marketing plan indicating peak

inventories should be prepared so as to facilitate advance arrangements with Railways for the supply of adequate number of railway wagons for transport and to enable road transport to be utilised, where economically feasible.

The availability of cooperative credit should be streamlined so as to provide for adequate fertilizer credit in kind linked with the marketing of produce, wherever, feasible. This should be supplemented by the availability of credit from commercial banks and from State agencies. Cooperative marketing agencies should be strengthened so as to enable them to avail of marketing credit from the Reserve Bank and credit guarantees should be provided to commercial banks to enable them to provide adequate marketing credit to a larger number of fertilizer distributors.

The State Governments as well as the manufacturers should earmark adequate funds for the provision of soil testing services and for organising effective fertilizer demonstrations in the field so as to convince the farmer of the economic benefits from planned fertilizer use.

All constraints on fertilizer distribution should be minimised and fertilizers should be freely made available to needy farmers.

A situation of adequate supply is likely to prevail in future. The potential for fertilizer use can be taken advantage of only if the manufacturers organise a distribution net-work on the basis of a proper marketing plan. A proper coordination of supplies made by different manufacturers as well as by Government in the same area would still be necessary.

IMPROVED SEEDS PROGRAMME

J. VEERARAGHAVAN

The Indian farmer has always been fully aware of the importance of good seed for securing high yields. The Government was also alive to the importance of good seeds in improving agriculture but its efforts to spread their use before 1928 had been few. It was following the recommendations of the Royal Commission on Agriculture urging greater scientific research in plant breeding and adequate arrangements for seed multiplication and distribution that improved seeds began to receive the serious attention of the Government. Under the stimulus given by the Indian (then Imperial) Council of Agricultural Research and Commodity Committees considerable research was undertaken by agricultural research stations in the country, specially on commercial crops like sugarcane, cotton and jute, and to some extent on paddy and wheat.

Between 1939 and 1950 the coverage of improved seeds increased from 6 to 11 per cent of the area under paddy ; 22 to 31 per cent of the area under wheat ; and 10 to 28 per cent of the area under jowar. These, however, are rough estimates and cannot be treated as indicating a general trend towards the use of good seeds. During the First Plan there was no special effort to spread improved seeds. The Grow More Food Enquiry Committee (1952) made a number of recommendations for spreading the use of good seed and for producing nucleus and foundation seed locally. These recommendations were not implemented but left over to the Second Plan. The Second Plan envisaged the setting up of a seed farm and a seed store in every National Extension Service Block to make it self-sufficient in meeting its seed requirements. The block seed farms would supply foundation seed to registered growers to be

multiplied on their farms in the villages and to be distributed to farmers through cooperative societies or other agencies. A target of 3,000 seed farms with a total area of 93,000 acres was fixed, but this was later revised to 4,328 farms with an area of 8,08,200 acres. More than 90 per cent of plan expenditure on improved seeds was earmarked for these farms.

At the end of the Second Plan, 1893 seed farms covering an area of 82,355 acres had been established, most of them established during the latter half of the plan period. About 20 per cent of the area under foodgrains was covered by improved seed from these farms. The coverage for cash crops was much higher: cotton 77 per cent, sugarcane 97 per cent and jute 53 per cent.

The failure of the seeds programme to make sufficient headway under the Second Plan is explained by the lack of coordination between seed farms and the block extension agencies, shortfall in the supplies of nucleus and foundation seed from research stations, lack of proper supervision and in some cases by the poor quality of land. The norms prescribed for proper seed multiplication seem hardly to have been observed in seeds production. The construction of seed stores envisaged by the plan did not keep pace with the establishment of the seed farms.

The Third Plan programme sought to remedy the defects in the implementation of the seeds programme under the Second Plan. To ensure the quality of seeds the setting up of seed testing laboratories was given high priority. The target for foundation seed farms was fixed at 4,789 covering an area of 1,19,225 acres. Actually 2,349 farms with an area of 1,04,604 acres were established. Of these 2,100 farms were provided with seed stores. The Third Plan also saw the beginning of a seed certification programme. The National Seeds Corporation was established in 1963 to produce foundation seeds of hybrid maize and other hybrids and to promote a sound seed industry and to certify seeds. A fillip was given to the production of certified seeds by the introduction of high yielding varieties towards the end of the Third Plan.

THE MODEL PROGRAMME

A Committee set up by the Indian Council of Agricultural Research in 1958 formulated a model seeds programme, the salient features of which may be summed up as follows :

- (1) Each development block should constitute a self sufficient unit for the production and distribution of improved seed and the entire area within the block should be brought under improved seed in a period of five years. Each block was to have a Government Seed Farm.
- (2) The seed produced at each stage of multiplication should be adequate for the succeeding stage and backward movement of seed from any secondary stage must not be permitted.
- (3) Cooperative societies should be utilised for producing and distributing improved seed in the block.
- (4) The varieties selected for multiplication should be few; only such varieties as are likely to be used over large areas and whose superiority over local varieties in respect of yield, quality and resistance to diseases and pests and other adverse conditions has been fully established should be selected for multiplication.
- (5) Nucleus seed produced under the direct supervision of the crop botanist should be multiplied on Government farms in one or two stages, so that enough pure breeders' stock seed is available to meet the requirements of each of the block seed farms.
- (6) The foundation seed produced on the block seed farm should be further multiplied through the agency of registered growers. The Gram Sevak and extension workers should be trained by the crop botanist in the technique of production of pure seed including identification of varieties, roguing, etc.¹

¹ Multiplication and Distribution of Pure Seed of Improved Varieties, ICAR, 1959.

A definite plan for saturation of the cropped area with improved varieties of seed, worked out in detail, phased over the years and indicating the quantities of nucleus, foundation or breeders', and certified producers' seed to be produced year by year of each variety is the prerequisite of success in a seeds programme. All State Governments accepted the concept of planning for seed saturation. This was a great step forward. The programme involves :

- (1) Selecting the improved varieties to be propagated ;
- (2) Determining the period of seed renewal ;
- (3) Determining the seed rate to be used by farmers ;
- and
- (4) Determining the seed yield per acre at different stages of the multiplication programme.

Any error in the premises or in calculation at any of these stages would adversely affect the programme of seed coverage. A mistake at the planning stage is serious as it cannot be corrected later. The selection of varieties presents the most difficult of the problems at the planning stage. It has to be based on the best scientific advice based on extended trials over a period. Extension has to assume a leadership role and introduce and popularise outstanding new varieties and not be guided by farmers' preferences alone.

The States have adopted different periods ranging between 1 and 5 years for seed renewal. Hybrids seed has to be renewed each year. For other varieties the period of renewal depends on the rate of deterioration of the seed and should be fixed for each variety after a thorough study. The Working Group on the Fourth Plan has suggested on an empirical basis seed renewal for the principal crops ranging from one year in the case of bajra to four years for wheat.

Seed rates vary widely from place to place depending on the conditions under which the crop is grown. At the planning stage the seed rate must be assumed realistically and the error if any should be on the side of over-estimating rather than under-estimating. Seed yields per acre should be assumed realistically and must allow for losses due to roguing, sorting and

processing at all stages but especially at the nucleus, breeder or foundation stages.

The production of breeders' and foundation seeds has to be planned two to three seasons in advance of the seasons in which the farmer needs the seeds. Seeds planning must, therefore, be forward looking and take account of the likely future changes and trends in agriculture. For example, increasing availability of water and fertilizers and the likely release or of new hybrids or other high yielding varieties will have to be taken into account at the time of planning for seed saturation.

A reserve stock of breeders' and foundation seed should be maintained. There is always the likelihood of sudden crop failures and unexpected increases in demand for some variety. Carrying such reserve stocks on an adequate scale is expensive but is necessary to a dynamic seeds programme.

It is necessary to increase the facilities at research institutes for the production of sufficient breeders' stock seed. The responsibility for ensuring adequate supplies of breeders' seed should be entrusted to the National and State Seeds Corporations.

Every possible step must be taken to speed up the release of new varieties and the pace of their spread. The Central and State Variety Release Committee set up recently is expected to screen scientific data relating to varieties and to recommend the varieties to be popularised.

IMPROVED SEED PRODUCTION UNDER THE SECOND AND THIRD PLANS

The programme of seeds production and multiplication under the Second and Third Plans envisaged the production of nucleus and breeders' seeds in Government research farms, their multiplication into foundation seed in Government Seed Farms established in every block and the multiplication of foundation seed by selected farmers under strict supervision. The Plans provided for the certification of seeds by governmental agencies. The decentralisation of the production of

foundation seed was intended to avoid transportation costs and to involve the block staff actively in the programme. The control of production of foundation seed was placed in the departments of agriculture to ensure the quality and purity of the seeds.

The block farms set up were small covering an area of about 25 acres each. The size was soon found to be too small for efficient operation. Technical personnel in sufficient numbers were not available to manage the large number of farms and even to inspect them. Farms were frequently located in land unsuited for cultivation. Production losses were heavy. Supplies of breeders' seed were not available from research farms. Finally there was no processing equipment at the farms.

A study team of the COPP considered the small farms as economically unsound and recommended larger farms of a hundred acres to serve several blocks and there has been a change of policy in this direction. There are fewer farms now; 2349 covering an area of about one lakh acres. These are considered adequate to produce all the foundation seed needed. There has also been a marked improvement in the production of seed farms since 1961.

The production of foundation seed requires greatest care if its quality and purity are to be maintained. Frequent inspections by crop specialists are necessary. All off-types should be removed and contaminated plots if any should be destroyed. Harvesting, cleaning and bagging should be done under the supervision of responsible officers of the agricultural departments and correctly labelled.

In the multiplication of foundation seed into producers' seed similar precautions are needed. The multiplication is done through registered growers classified as A, B and C classes of growers. 'A' class growers receive their seed from the foundation farms direct, 'B' from 'A' class growers and 'C' class from 'B' class growers. Each grower is allowed to grow only one variety on his holding. Cultivation is under the supervision of the Agricultural Extension Officer who also certifies to the purity of the seed.

It has been noted by a P. E. O. study on the basis of a

sample survey carried out in 1961 that the quality of seed produced by registered growers was not quite satisfactory, the reasons being failure of growers to take necessary precautions such as weeding, roguing, plant protection measures and in regard to storage. Either sufficient guidance was not available to growers or proper vigilance was not exercised to assure proper cultivation.²

The seeds programme needs an adequate and technically qualified staff for field inspection and certification. The success of the programme is dependent to no small degree on the integrity of the farmers chosen as growers. For effectively supervising the programme it is now considered necessary to concentrate seed production in extensive and contiguous areas rather than spread it to all the villages as is the case at present. It has also been suggested that an immediate survey should be made of areas most suited for seed production of different crops and for their development for seed production.

SEED DISTRIBUTION

Under existing arrangements a farmer could obtain his requirements of improved seed from the following institutional agencies :

- (1) Stores or depots of the Agricultural Department of State Governments;
- (2) Cooperative Societies;
- (3) Panchayats;
- (4) Block Office/VLW; and
- (5) Registered growers.

Some states which include Madras, Mysore and West Bengal leave the distribution to registered growers without entering into any arrangements with them regarding procurement, storage and transportation of seed. The Agriculture Departments and the block stores are also reported to be distributing seed to growers as a transitional measure to secure a balanced

² Study of the multiplication and distribution programme for improved seed, Programme Evaluation Organisation, Planning Commission, 1961.

distribution from registered growers under the general supervision of the block administration and the village level workers.

In Maharashtra, Gujarat, Orissa, Bihar and Uttar Pradesh cooperatives are entrusted with the work of purchasing or procuring seed from the growers and distributing it to cultivators. Whereas in Gujarat and Maharashtra the seed produced by registered growers is purchased by the cooperative societies for sale to cultivators. In Uttar Pradesh the cooperative stores supply seed on loan (Sawai) and the cultivators return the same with 25 per cent interest which is again advanced to cultivators during the next sowing season. In Rajasthan, the Apex Cooperative Marketing Society is responsible for procurement of seed, while distribution is entrusted to Panchayat Samiti. In some cases, Panchayat Samitis also procure seeds from registered growers for distribution to cultivators.

In Andhra Pradesh, Madhya Pradesh, Punjab, Assam and Kerala procurement and distribution are done by the Government. The seed is procured by the Agricultural Department and distributed through its own depots, block depots or through village level workers.

Distribution through cooperative societies has the advantage that the seed can be given to the members of the society on credit and other inputs needed can also be made available along with seeds. Cooperative societies, however, have not found the handling of seed a profitable venture. There is an element of risk as seeds of some variety or other might remain unsold resulting in loss. To interest the cooperatives in the marketing of seeds an adequate margin of profit must be allowed.

The proper distribution of seeds should be ensured through an adequate number of sales points and storage facilities. The Fourth Plan Working Group has recommended the construction of about 6,000 seed stores each capable of holding 100 tonnes in addition to the existing 3,000 stores located in the seed farms.

Several agencies will have to be utilised in distributing

seeds. Distribution through multiple agencies competing with each other on a fair basis would be in the interest of the farmers. There should be no hidden subsidy in the distribution of seeds as is the case when the block or Government agencies are utilised. Subsidies may be needed for distribution of seeds to farmers in remote and difficult areas to avoid placing an undue burden on them. But the subsidy should be available equally to all agencies distributing certified seed whether they are registered growers, seed companies, private seed merchants, Panchayats or cooperatives.

It is important that seed should be distributed only in *sealed bags* as sale in open bags leads to possibilities of adulteration. The Seed Act (1964) envisages that seed should be sold only in containers which are properly labelled. The label should state the purity and germination rate of the seeds among others. Along with the bag of seeds, a leaflet on the package of practices for better cultivation of the particular variety should be given to the farmer. Extension agencies should ensure the proper cultivation of the varieties distributed. The seed stocks held in stores or with farmers should be periodically sampled and tested at Seed Testing laboratories to check their viability.

By far the best means of providing an adequate distribution system for seeds is the development of a seed enterprise in the truest sense of the term. This means that there should be a large number of seed merchants and seed companies working under competitive conditions for marketing certified seeds. Some of these may be in the public sector, but the nature of seed enterprise is such that a number of medium or small sized businesses operated by private enterprise can more effectively serve the farmers in their respective areas.

A seed enterprise will not develop unless restrictions on prices and movement of seeds are removed. In a country where the importance of the marketing function is generally ignored, cries of "profiteering" are likely to be raised as soon as a seed merchant tries to provide a return for himself after adequately covering his costs and risks. As the volume of

turnover in seeds will be small, a good margin must be earned by the seed producer and wholesale and retail dealers to make the business in seeds profitable. The seed business is a business in quality products and quality products will be high-priced.

The lack of financial resources is the main constraint on the development of a seed industry. There is no financial institution in the agricultural sector to help the establishment of a seed industry. Commercial credit is not forthcoming in any measure as the seed industry is new. The only alternative is for the agriculture department which is main purchaser of the seed for distribution to make advance payments to seed enterprises to build up an industry in seeds.

ROLE OF VARIOUS AGENCIES

We have seen that there is a multiplicity of agencies in the field of seed production and distribution. These are :

- (1) The National and States Seeds Corporations ;
- (2) The Departments of Agriculture in Government of India and in the States ;
- (3) The Indian Council of Agricultural Research and the Central Research Institutes ;
- (4) Research Institutes in the States and Agricultural Universities and Colleges which have farms attached to them; and
- (5) Seed merchants, and public cooperatives and other agencies.

The multiplicity of agencies would be an advantage only if their programmes are well coordinated. Either the Department of Agriculture or the National Seeds Corporation should take up this task and set specific tasks and targets for the different agencies. They should keep in touch with the progress made by the different agencies and ensure that deficiency in the performance of one agency is made good with the help of others.

The overall responsibility of ensuring adequate supplies of foundation seed of all varieties of inter-state or all-India importance should be entrusted to the National Seeds Corporation and a similar responsibility for varieties of seeds within the States should be vested in State Seeds Corporations. The Seeds Corporations, both National and States, should be autonomous bodies with considerable freedom to operate in their fields, though their programmes and targets may be prescribed by the Government. The National Seeds Corporation and the State Seeds Corporations, acting together, could foster a private seed industry producing and marketing the certified seeds under strict quality control.

Pending the development of a sound marketing system, the distribution of seeds through the Department of Agriculture should be continued. The National Seeds Corporation should serve as a pioneer in the introduction and promotion of new varieties, establish training facilities, undertake and promote research on seed processing and packing and provide technical guidance to seed companies and seed corporations.

As the development of private seed industry during the next decade might be slow and might not be able to meet the requirements of agricultural development, the National Seeds Corporation and the State Seeds Corporations will have to undertake to produce at least 50 per cent (25 each) of the requirements of the country, the remaining 50 per cent of the requirements being left to private seed industry. The production and marketing of certified seeds by the National and State Seeds Corporations should be kept distinct from their promotional work.

The policy of Government in regard to seed production and distribution may be summarised as follows :

- (1) The ICAR will be responsible for the production and maintenance of adequate quantities of breeders' seed of all Indian varieties and hybrids.
- (2) The National Seeds Corporation will be responsible for the production and maintenance of adequate quantities of all India foundation seeds of hybrids.

- (3) State Government would be fully responsible for production of adequate quantities of certified seeds of hybrids and foundation and certified seeds of other varieties.
- (4) Certification and seeds testing would ultimately be functions of State Governments though in the interim period National Seeds Corporation would continue to assist the States in these functions.
- (5) The National Seeds Corporation would continue its commercial functions and also act as a coordinator, promote and pioneer in the field of seeds development.

QUALITY CONTROL, PROCESSING AND CERTIFICATION

Quality control comprises of :

- (1) The inspection of the field crop from planting to harvest to ensure that the variety is pure and conforms to prescribed standards ;
- (2) Ensuring the proper processing and packing of seeds to preserve their viability under normal conditions, removal of all foreign matter, etc., and the treatment of the seed and with fungicides and insecticides.
- (3) The inspection and testing of seed samples from the production stage until the seeds are sold to ensure that the viability of the seeds has not deteriorated during processing or storage.

The International Crop Improvement Association has laid down the field standards required for pure seed production of different crops. These standards modified to suit local conditions must form part of the contract with farmers or other agencies producing seed. A prescribed number of inspections is carried out in accordance with a statistically determined pattern. Roguing of undesirable plants should be done. For cross-pollinated crops the requirements of isolation should be fully met and these should be checked frequently. Similarly, where special operations are prescribed like detasselling in hybrid maize, these must be scrupulously observed.

The seed inspector has to be present at the time of harvesting to prevent possible mixtures. The seed should then be uniformly dried to a prescribed moisture content of 10 to 12 per cent in the sun or in processing plants preferably the latter.

The seeds must be cleaned by machine to remove undesirable material such as broken seeds, mixtures, etc., to grade the seed, eliminating both under-sized and over-sized seeds. The seeds may be graded by size or by weight.

Seeds must be treated with a fungicide like *captan* or *thirm* and an insecticide like *malathion* or *DDT* against insect and fungal attack during storage.

The processed seed has to be suitably packed to ensure that viability is retained and sealed to prevent adulteration. For this purpose the seeds have to be packed in small cloth or polythene bags and stitched by special machines and a lead or tin seal is placed on it. A certification tag is attached to the bag indicating the variety, germination percentage, freedom from weeds and mixtures, etc. The seal and certification tag are the guarantees of quality.

Samples are drawn from the seeds after processing and tested at independent Government Seed Testing Laboratories. These tests are for determining the germination percentage, moisture content, freedom from mixtures, weeds, etc. In accordance with international conventions certain minimum standards are prescribed for each crop. Only seed conforming to the minimum standards is certified.

If the seeds are not needed for immediate sowing they should be put under dry storage. If the weather is cool and dry the seeds can be carried over a season or two without loss of their viability. In summer and monsoonish weather air-conditioning and de-humidification are necessary. If the seeds are to be stored for 4 or 5 years, as may be the case with foundation seeds, cold storage becomes essential.

Storage in a central warehouse is desirable as it is economic and quality can be ensured. But seeds have to be distributed ahead of the sowing season to selling points. The conditions of transport and storage at railway stations and even

in the block seed stores are often not conducive to the retention of the quality of the seed. Routine as well as surprise checks are, therefore, necessary to ensure that the seeds at the retail level are in good condition at the time of sale. Normally the certification of seed is valid only for 6 months and the period of validity is stamped on the certification tag. Re-certification should be insisted on beyond the period.

Many administrative problems arise in enforcing a quality control programme of the above type. Seed certification and processing are still new to India, the National Seeds Corporation being the only agency doing such work at present. There is resistance to roguing of field crops. If certain seed crops are rejected, either at the field inspection stage or during subsequent processing, there is quite an outcry. The inspecting staff have, therefore, to handle seed growers with considerable tact but there should be no compromise on seed quality or in adhering to prescribed standards.

The Seeds Act (1964) envisages the setting up of Seed Testing and Certification agencies in the States. Under the Act, the State Governments and Central Government are competent to notify specific varieties for defined areas. When a variety is so notified for a certain area, no seed of that variety can be sold unless it conforms to prescribed minimum standards of germination, freedom from mixtures, weeds, etc. A dealer who does not observe these provisions is liable to be prosecuted. It may be mentioned that above aspects cover only physical aspects of purity as distinguished from the genetic aspects. The Seed Act does not make it compulsory for the seed dealer to get the seed certified for genetic purity. However, if a seed dealer wants to sell seeds which are genetically proven, he can make use of certification facilities provided by the States which are empowered to set up certification agencies.

Trained personnel are needed for the certification and processing of seeds. The larger processing plants have their own mechanics and engineers. But in many places where these will not be available, the agricultural inspector who is usually a botany or agricultural graduate has to be proficient in handling

processing machinery and should be able to undertake some minor repairs. A seed certification programme requires of a competent team of inspectors. These have to be recruited and trained.

An estimate of the cost of certification of hybrid maize seed is about Rs. 25 per acre. It is much less for self-pollinated crops like paddy. Processing and packing expenses will cost about Rs. 30 a quintal. The cost is not excessive by any means and it is not necessary to subsidise a programme of certification which can support itself.

There is need for organising a comprehensive programme of quality control for all varieties of seeds. Even pending the full implementation of the seed law, State Governments must take the necessary steps for recruiting and training the staff needed. Seed Testing Laboratories should be quickly established. A good deal of research has to be done on the processing, packing and the storage of seeds including the use of polythene of varying thicknesses for proper storage of seed under the warm and moist climatic conditions of India.

One of the major bottlenecks in extending seed processing and certification is the non-availability of the necessary mechanical equipment for processing and other equipment like land levellers, planters, seed drills, etc., needed in modern agriculture. Most of the equipment can be manufactured in India. As the demand for it is scattered entrepreneurs are not likely to be interested in its manufacture. Some central agency should take up the responsibility of collecting the indents of all State Governments and arrange for the manufacture of the equipment for phased delivery so that the bottleneck is removed.

Agricultural productivity can be significantly increased by the use of improved seeds. The striking benefits that accrue from new improved varieties are obvious. The benefits from the use of genetically pure and physically healthy and viable seed of existing varieties are also evident. Such seeds ensure a uniform and good stand of crop and prevent or reduce seed-borne diseases. Farmers appreciate these facts and are very

receptive to the use of good seeds and are ready to incur considerable expense and trouble to secure good seeds of the latest and best varieties. The atmosphere for a seeds programme already exists in the country.

Indian agriculture, as indeed the entire Indian economy, is in the grip of vicious circle of shortages. This vicious circle can be broken at many points. Abundance at anyone point will help overcome shortages at other points. Production of ample seeds of good quality will improve agricultural productivity. The production of seeds is largely a matter of organisation and the utilisation of the findings of research. It requires little foreign exchange or extraordinary technical skill. With determination, with the streamlining of the present administrative structure, and with more emphasis on substance than on procedures, it would be possible through an improved seeds programme to achieve higher productivity and assist in effecting a possible break-through in agriculture that the country needs today.

ESTIMATED ANNUAL SEED REQUIREMENT OF CEREALS IN INDIA

Name of the Crop	Acres in Millions	Seed Rate Kgs.	Quantity of seed required Tons	Seed Renewal Period Years	Renewal Area in Million Acres	BREEDER SEED						FOUNDATION SEED						CERTIFIED SEED			
						Acres	Yield per Acre Qtl.	Quantity Acres in Tons	Yield per Acre Qtl.	Quantity in Tons	Acres	Yield per Acre Qtl.	Quantity in Tons	Acres	Yield per Acre Qtl.	Quantity in tons					
2	3	4	5	6	7	8	9	10	11	12	13	14	15	16							
CEREALS																					
Rice	90	12	1080000	4	22.5	12	15	18.0	1440	15	2160	180000	15	270000							
Jowar	45	5	225000	3	15.0	39	3	11.7	2344	4	938	187500	4	75000							
Wheat	33	30	990000	5	6.6	178	10	178.0	5940	10	5940	198000	10	19800							
Bajra	29	2	58000	1	29.0	1	5	0.5	106	5	53	29000	5	14500							
Maize	11	6	66000	1	11.0	11	6	6.0	1100	6	660	110000	6	66000							
Barley	7	20	140000	5	1.4	45	2-1/2	11.2	560	2-1/2	1400	120000	2-1/2	28000							
Ragi	6	4	24000	5	1.2	1	4	0.4	120	4	48	12000	4	4800							
Small Millets	11	4	44000	5	2.2	2		0.8	220	4	88	22000	4	8800							
T. tal Cereals:						232		2627000		88.9	289		266.6	11830		11287		858500		665100	
PULSES																					
Gram	23	25	575000	5	4.6	333	6	200.0	7986	6	4792	191666	6	115000							
Other Pulses	38	4	152000	3 to 5	8.4	13	3-1/2	4.5	836	3- 1/2	384	96000	3-1/2	264000							
COMMERCIAL CROPS																					
Groundnut	17	30	510000	5	3.4	1435	4	574.0	19125	4	7650	255000	4	102000							
(in Karnals)																					
Sugarcane	6.28	3 tons	18.84	5	1.3	1250	30	375.0	12500	30	37500	12500	30 tons	3.75 million							
(State)			(million)																		
Cotton	20.14	5K g.	100700	3	6.7	680	50K g.	34	6710	50	335.5	67100	50 Kg.	3355							
Tobacco	10.46	150K g.	1560	3	3.5	1	50K g.	1.1	31	50	1.50	10440	50 Kg.	22							

PLANT PROTECTION

SARDAR SINGH

Insects, fungi, bacteria and similar pestilances have been a menace to man and his crops from the very beginning of history. The science of protecting crops and produce from the ravages of insect pests, plant diseases, weeds, rodents and other injurious animals is called plant protection. The protection of crops and produce from these ravages has developed from old empirical methods to the present-day sophisticated techniques with the aid of modern technology. In India, the field application of plant protection measures over extensive areas gained recognition simultaneously with the launching of the increased agricultural production drive as it is considered one of the four major factors of production along with improved seeds, fertilizers and irrigation. A brief account of the history, level of development, needs and future outlook for plant protection in India follows.

ORGANISATION

There is general agreement among scientists that Indian agriculture sustains losses in production due to the nefarious activities of hundreds of injurious species of insects, nematodes, fungi, bacteria, viruses, parasitic flowering plants, weeds, rodents and other harmful animals to the extent of 20 per cent of gross produce valued at over one thousand crores of rupees.

Taking cognizance of the huge losses, the Indian Museum initiated work on economic entomology and published notes on the subject as far back as 1889. The first agricultural entomologist to the Government of India was appointed in 1901. The post was redesignated as Imperial Entomologist on the establishment of Indian (then Imperial) Agricultural Research Institute in 1905. Subsequently, most of the State Governments created separate sections of Entomology in the respective departments of Agriculture. Until 1946, plant protection in India

was largely the concern of State Entomologists, Mycologists or Plant Pathologists, in addition to their duties of teaching and research. The establishment of the Directorate of Plant Protection, Quarantine and Storage in the Ministry of Food and Agriculture in 1946, was an important landmark in the field of plant protection in India. This was followed by the establishment of similar ever-expanding organisations in the States. At the present time, the technical personnel for plant protection work in nearly all the States are located at the State headquarters and district level though additional plant protection extension staff is being posted in the Intensive Agricultural District Programme, Intensive Agricultural areas and High-Yielding Varieties Programme areas. It is estimated that there are over 1500 graduate and post-graduate plant protection officers supported by over 6000 other ranks in the Central and State organisations in India at the present time. They have the active support of the National Extension Service of over 5000 Development Blocks spread all over the country. They benefit from the results of research of over 2400* graduate and post-graduate entomologists, plant pathologists and weed control specialists at the eight Agricultural Universities and Central, State and privately supported research establishments in India.

MODUS OPERANDI

To meet the challenge of the plethora of organisms that damage different crops in the field and commodities in the stores, a multi-pronged attack on different fronts is necessary. Different methods have to be employed individually and collectively to destroy insects or fungi if they appear in epidemic form or to forestall their incidence by undertaking prophylactic measures. The endemic areas need to be marked out for instituting pest eradication campaigns. Recourse has to be taken to legal measures to ensure community-wide action against general pests and quickly spreading infections and restrictions

*These figures of the number of scientists assisting the plant protection specialist in his work are only approximate.

have to be placed on the import of plants and plant materials to check the ingress of exotic pests and diseases. One method may be effective in dealing with an insect pest while a different one may have to be employed in the case of another. A combination of several measures may be necessary to tackle a third pest and a package of practices would need to be evolved for handling the pest and disease complex of a crop. A few examples of what has already been accomplished in this country are given below.

Physical Measures : These include manipulation of temperature and humidity, light and sound waves, etc. Cold storage of fresh and dry fruits and vegetables is often resorted to for escaping fruit fly and rot fungus damage.

Application of dry heat to commodities and superheating of stores kills infestation in woollens and pests of stored commodities. Boiling, steaming and dipping in hot water (Loose smut of wheat) similarly helps in avoiding several kinds of biological infection.

Mechanical Measures: Methodical destruction of organisms and the infested commodities in early stages of infection over the area of incidence with a view to checking the spread of infestations has been employed from the very early times. Destruction of infested young shoots of sugarcane and the stubbles after harvest has helped a great deal in keeping the incidence of sugarcane borers at a low level. Similarly, the high incidence of red rot disease of sugarcane and ergot disease of *bajra* have been materially reduced by mechanical methods. Burning of sugarcane *debris* and stubbles in the fields and total destruction of infected by-products are commonly resorted to. Composting of farm waste also helps to destroy incipient infection.

Collection and destruction of egg masses (cabbage butterfly and sugarcane top borer) on an intensive scale also help a great deal in keeping down pest populations.

Cultural Practices: Sowing of a crop late (maize at the end of July or in August in Punjab) helps to escape severe incidence of the stem borer. Similarly, early sowing of cucumbers in the months

of November-December helps to ward off an attack by red pumpkin beetle in Punjab. Prohibition of the growing of a crop in a localised area for a season with a view to eliminating a specific pest (potato tuber moth) of the crop has been enforced with gratifying results. Rotations have been evolved for keeping down the population of certain pests and soil-borne diseases of crop plants.

Recent trends in successive growing of the same crop in the same field or area have, however, posed serious problems to the plant protectionist, e.g., ratooning of sugarcane, jowar, etc., growing of two or three crops of potatoes successively in the same field, introduction of period-bound varieties like T.N.I., I.R. 8 of paddy so that the same crop is available in different stages of growth in the same area to the insect/pathogen resulting in rapid multiplication of pest disease complex.

Biological Control: 'Set an insect to kill an insect' has been successfully employed in suppressing some insect pests in this country: apple woolly aphid by a parasitic wasp, the cottony cushion scale of citrus by the predatory *Rodolia* beetle and the coconut caterpillar by a complex of larval and pupal parasites of indigenous origin. Recent research has shown that control of San Jose scale of apple by a parasitic wasp, the control of sugarcane borers by egg parasites from Taiwan and other countries, of castor semilooper by *Bacillus thuringiensis* and of the South African giant snail by predatory snails could be accomplished by establishing suitable facilities.

The cochineal insect has been successfully employed to wipe out the ubiquitous prickly pear weed in South India and work is in hand to establish a gall-fly for suppressing the Eupatorium weed.

Application of Chemicals : Use of poisonous chemicals for killing insects or injurious animals or disinfecting a bacterial or fungal infection has been practised since the 1920's. The chemical may act by the insect eating the poisoned food material or coming into contact with it through a direct hit or by picking it up by the exposed parts of the body or it may pervade the atmosphere as a gas or mist or smoke. The nervous or

respiratory or circulatory system may be affected. The chemical may be used as a dust, granule, bait, suspension, emulsion, solution, aerosol, smoke or gas and applied from the ground or air with the help of different kinds of hand or power-operated application equipment like sprayers, dusters, mist blowers, fog generators, etc. As more and more potent chemicals are being evolved, this method of pest control is gaining popularity almost to the exclusion of other methods. Repeated applications of different chemicals during the various stages of plant growth are necessary for tackling the insect pest, plant disease and weed complex of a crop and packages of plant protection practices have been worked out for producing clean crops giving high yields per acre.

Legal Measures : With a view to checking the introduction of exotic pests and diseases along with the import of plants and plant materials through international commerce or individual travel, it is necessary to place restrictions on the import of potentially infested materials. Necessary powers were acquired by the Government of India under the Destructive Insects and Pests Act, 1914 and entry of plants and plant materials is allowed through nine sea ports, seven airports and four land frontiers. It has been possible to keep out the notorious cotton boll weevil, Colorado potato beetle and ring rot, codling moth of apple and the Mediterranean fruit fly but the San Jose scale and woolly aphid of apple, the cottony cushion scale of citrus, wart disease and golden nematode of potato, the bunchy top and wilt of banana have slipped in. In addition, it is necessary to export agricultural commodities free from pests and diseases. This necessitates issue of phytosanitary certificates conforming to international standards. Both the Central and State Plant Protection Departments issue such certificates after suitably treating the export commodities.

For checking the spread of introduced pests and diseases from the small localised areas to other areas and to organise control of pest and disease epidemics on a community-wide basis, it is necessary to take to secure compliance with the rules.

Necessary statutory powers have been acquired by the State Governments under State Pests, Diseases and Noxious Weeds Acts. With a view to bringing the State measures to a common level, the Government of India has circulated a model Pest Act to the State Governments and Union Territories and several Governments have modified their legislation accordingly. Almost all the States have at one time or another notified pest, disease and weed epidemics under their respective Acts and cleaned up desert locusts, Deccan wingless grasshopper, phadka grasshopper, hairy caterpillars, paddy bug, coconut caterpillar, pohli (*Carthamus*) and *Argemone* weeds. Recently notifications have been issued under the State Pest Acts for organising aerial operations for spraying pesticides in consolidated blocks for controlling insect pest complexes of various crops.

PLANT PROTECTION IN THE FIVE YEAR PLANS

The different methods of pest and disease control described above were given almost equal importance up to the beginning of the Second World War. Chemical methods of control were conducted with the help of chemicals of inorganic and plant origin and the total coverage of cropped area by plant protection measures was not very large. But the advent of the synthetic organic chemicals during the Second World War ushered in a new era of plant protection. The strategy for pushing forward plant protection programmes during the Five Year Plan periods was mainly based on chemical methods of control though the use of other methods was not ruled out. Area treated with plant protection measures during the last year of the First Five Year Plan was 6.1 million acres; during the last year of the Second Five Year Plan 16 million acres and during the last year of the Third Five Year Plan 43 million acres. The coverage rose to 59 million acres in 1966-67, the first year of Fourth Five Year Plan. The popularity of the chemical methods of control is also reflected in the increased consumption of pesticides. In 1955-56, 3750 tonnes of technical grade materials in various formulations and valued at Rs. 1.36 crores were used. In 1960-61, 14,600 tonnes of technical grade

materials valued at Rs. 4.6 crores were utilised. In 1965-66 about 25,800 tonnes of technical grade materials valued at approximately Rs. 13 crores were employed. During 1966-67, 33,000 tonnes of pesticides in technical grades valued at Rs. 30 crores were sold for plant protection work.

Encouraged by the experience during the first three Five Year Plans, the high cost benefit ratio* of plant protection measures, the necessity of a dynamic plant protection programme for the success of the high yielding varieties programme of foodgrains and intensive development programmes for cash crops (cotton, jute, oilseeds, sugarcane, plantation crops) a rather bold programme for plant protection, has been formulated for the Fourth Five Year Plan period. It is proposed to cover 210 million acres in 1968-69 and the requirements for pesticides have been assessed at 84,000 tonnes of technical grade materials costing Rs. 84 crores for the formulated products. It is envisaged to cover 50 million acres with treated seeds, institute anti-rat campaigns in 20 million acres, destroy soil and polyphagous insects over 20 million acres, organise prophylactic treatment of crops for control of pests and diseases on an intensive basis over 113 million acres and undertake chemical weed control over 7 million acres. Efforts will be directed towards treating all seeds that go into soil with disinfectants, controlling polyphagous pests in endemic areas, suppressing pest and disease epidemics when they appear and applying package of plant protection measures including the pre-treatment of soil and seed before sowing and spraying of nursery, young and mature crops properly timed and spaced.

ESSENTIAL REQUIREMENT

For ensuring the success of a dynamic plant protection programme attention has to be paid to three aspects : (i) Technical Personnel, (ii) Pesticides, and (iii) Application Equipment.

*A detailed examination of 417 experiments indicated the cost benefit ratio to vary from 1:3 to 1:40 and the percentage increase in yield ranged from 9 to 15 and in individual cases as high as 40.

Technical Personnel : For the successful prosecution of crash programmes that are envisaged, an enormous organisation effort is required for advising growers, arranging supplies of pesticides and application equipment in adequate quantities, organising control operations, laying out demonstrations, carrying out surveys of pests and diseases and for enforcing national and State legislations.

Even though it is the responsibility of the cultivator to grow his own crops, it is necessary to provide him assistance by way of technical know-how and supply of inputs with a view to enabling him to obtain larger yields per acre. Thus, the Plant Protection Specialist would need to issue timely warnings about impending epidemics of pests and diseases, demonstrating the appropriate use of chemicals for suppressing pests, diseases and weeds in the fields, keep plant protection problems of the area under continuous study and remain in close contact with research institutions and experimental stations. He would also popularise prophylactic treatments of crops by pesticides, impart knowledge about improvements in plant protection techniques and help in keeping application equipment in working condition. Though the campaigns for suppressing the population of endemic pests would be farmer-orientated, much organisational effort would be necessary for advising growers in campaign strategy, preparation and distribution of baits, dusting and spraying of pesticides, treating of seeds, etc. The methodology involved in handling potent chemicals and modern equipment would need to be demonstrated and the importance of timely action impressed upon the cultivators. In most cases, the control operations will be adopted voluntarily by the farmers in the infested localities simultaneously as pest and disease organisms are easily spread and carried over from place to place. Much success can be achieved through persuasion but at times, it would be necessary to use compulsion under the Pests and Diseases Act when the obstructive attitude of a small minority may endanger the well-being of the farming community.

For the above purpose, there is thus need for qualified field personnel which should be competent to diagnose pests,

diseases and weeds and render necessary technical advice for their control. Besides strengthening of staff, greater emphasis would need to be placed in publishing and disseminating information on new techniques of pest control. Films and film strips could also be made use of for publicity work. An ideal set up for organising plant protection work in India would require about 7,560 additional graduates and post-graduates in plant protection as follows :

	Class I (Post-graduate)	Class II (Post-graduate)	Class III (Graduate)	
State level	10	30	200	
District level	—	320	—	
Block level	—	—	5000	
Intensive Development Districts	—	15	1200	
Central Organisation	10	25	190	
Private Industry and Trade	30	70	100	
	<hr/> 50	<hr/> 460	<hr/> 6690	<hr/> 7200
		5% wastage		<hr/> 360
				<hr/> 7560

The basic training of such personnel will be undertaken at the State Agricultural Universities and Agricultural Colleges but facilities for in-service training would need to be developed for keeping the plant protection specialists conversant with the latest information and progress that is being made in the field of plant protection. For this purpose training institutes at the Central and the State level need to be developed.

The Government of India has established a Plant Protection Training Institute-cum-Field Station at Hyderabad where three courses of 3 months' and one course of 9 months' duration are held every year. Facilities have been developed for training about 180 candidates in the first and 40 candidates in the second

course annually. Such trained personnel could serve as a nucleus for extension of similar training facilities at the regional level particularly at Agricultural Universities.

Pesticides: Though chemicals of inorganic nature were used during the pre-World War II period for the control of pests and diseases in India, the quantities used were small and the same were mostly imported. It was with the introduction of synthetic organic compounds like DDT and BHC that control of pests and diseases in the field got a big push. Initially it was necessary to undertake intensive work to find the utility of these synthetic compounds in controlling the pests and diseases and when their usefulness had been established and sizeable quantities began to be used it was considered necessary to organise manufacture of the various groups of chemicals in the country either with raw materials locally available or imported from abroad so that it was necessary to spend the minimum amount of foreign exchange for providing the required quantities of the various chemicals for plant protection work.

In view of the very wide range of insect pests with varying habits and of plant diseases, the use of a wide variety of chemicals is necessary. Thus the plant protection specialist has to deal with chlorinated hydrocarbons (DDT, BHC, toxaphene, aldrin, dieldrin, chlordane, heptachlor, endrin) which have long residual effect, organo-phosphates (malathion, parathion) which have quick knock-down, systemics (dimethoate, demeton, phosphamidon) which have to be absorbed into the plant sap and to be sucked by the insects to kill them, carbamates which have both residual effect and knock-down, seed-dressing materials (organo-mercurials, thiram, captan), fungicides (copper oxychloride, zineb, maneb, ziram, ferbam, dusting and wettable sulphur), fumigants EDCT mixture, HCN gas (calcium cyanide, sodium cyanide), ethylene dibromide, methyl bromide, aluminium phosphide, rodenticides (zinc phosphide, strychnine hydrochloride, barium carbonate, warfarin, fumarin, nematocides (DD, nemagon, vapam), etc.

At the present time 28 pesticides : BHC, DDT, toxaphene, malathion, parathion, dimethoate, zineb, ziram, thiram, sulphur

dust and wettable, organo-mercurial salts, copper oxy-chloride, copper sulphate, copper oxide, zinc phosphide, warfarin, fumarin, barium carbonate, strychnine hydrochloride, ethylene dibromide, methyl bromide, ethylene dichloride, carbon tetrachloride, aluminium phosphide, ester and amine salts of 2,4-D and 2,4,5-T, streptocycline and aureofungin are manufactured in the country, many of the items in more than one plant and the arrangement for manufacture of several others (endrin, carbaryl, phosphamidon) has reached an advanced stage. The overall picture is given in Appendix I.

Some pesticides like endrin, aldrin, chlordane, dieldrin, heptachlor, lindane, kelthane, endosulfan, diazinon, phosphamidon, demeton methyl, sumithion, DDVP, phorate, trithion, captan, calcium cyanide and some weedicides and raw materials like copper, lead, tin, zinc, mercury, phosphorus, sulphur, ethylene diamine, maleic anhydride, toluene, etc., are imported. The allocation of foreign exchange for the import of pesticides and raw materials for manufacture of pesticides during recent years is given in Appendix II.

The pesticides produced in the country as well as those imported from abroad are formulated into dusts, water dispersible powders, emulsion concentrates, solutions, granules, smoke generators, etc., in several processing plants both in the organised sector (18 units) and the small scale industries sector (71 units) and the total installed formulation capacity is over four times the technical grade materials of pesticides available.

The total investment in the pesticides manufacturing industry is estimated at over Rs. 6 crores and that for the formulating industry at about rupees two crores. It is envisaged that a further investment of Rs. 25-30 crores will be necessary for producing the additional quantities of pesticides outlined in Appendix I. The new plants for manufacturing the various quantities are being put up expeditiously.

Both the technical grade materials manufactured in the country and the various formulations produced from them and imported materials conform to specifications laid down by the Indian Standards Institution and their quality is as good as any

in the world. The Indian Standards Institution has laid down 81 specifications for pesticides and pesticidal formulations so far and has issued 173 licences to 44 firms for marketing 24 products with ISI Certification Mark. The ISI Certification Mark is a third party guarantee to the consumer that the contents of the package so marked conform to the respective ISI standard.

Pesticides are distributed to the cultivators by the Agriculture and Community Development Departments, Cooperative Marketing Societies and some Panchayats. In addition, over a dozen firms have an extensive network of distribution agencies and it is estimated that there may be over ten thousand government, cooperative and private agency sale points in different parts of the country. These are hardly adequate in number and every effort needs to be made to augment them so that pesticides may be made available to the cultivator at bullock cart distance from his farm. Pesticides are poisonous materials and they should be handled with care. Almost all accidents reported due to pesticides are the result of negligence in observing the precautions necessary for use by the operator. An extensive educational campaign is under-way for making the cultivator familiar with the proper use of pesticides. Statutory powers for regulating the manufacture, transport, sale and use of pesticides are also proposed to be acquired when the Insecticides Bill at present before the Parliament is passed into an Act.

Application Equipment : The varied types of formulation of pesticides and the different situations in which they have to be applied require correspondingly suitable types of application equipment. Local models of hand operated equipment became available in India in 1948-49. There are two firms licensed for manufacturing plant protection equipment (both hand and power operated) by the Directorate General of Technical Development. Recently three more firms have been licensed to manufacture power operated sprayers-cum-dusters. Many other firms in the Small Scale Industries Sector have started manufacturing hand-operated equipment and some power-operated equipment to meet the local State and regional demand. The total number

of units manufactured in India in 1966-67 in the organised and small scale sectors is estimated at over two lakh machines valued at over Rs. 410 lakhs. The major items manufactured are stirrup pumps, foot-pumps, rocking sprayers, compressed air pumps, pressure retaining sprayers, large volume motorised knapsack sprayer-cum-dusters, plunger dusters, dust applicators for burrows, rotary fan dusters (belly and shoulder-hanging types), power dusters (stretcher and trolley types), flame throwers, seed dressing machines, etc. along with ancillary equipment. With a view to exercising quality control, the Indian Standards Institution has laid down specifications for eleven different types of machines and four other standards are under preparation. Though no licences have been issued to plant protection equipment manufacturers under the ISI Certification Mark scheme, the equipment produced by some of the firms is of high quality and one of the firms has exported plant protection equipment worth over Rs. 9 lakhs to 16 countries in South East Asia, Middle East and Africa.

Both fixed-wing aeroplanes and helicopters are imported items and 18 Canadian, Polish, USA, Czechoslovakia and USSR fixed-wing aeroplanes and 11 helicopters are in use by the Directorate of Plant Protection, Quarantine & Storage and five private operators.

The total demand for equipment for covering 210 million acres in 1970-71 has been worked out as follows on the basis of two-thirds serviceability rate and two-thirds of the area to be covered falling in about 30 days (daily average coverage by hand-operated and power-operated units being 2 and 10 acres respectively) during the *kharif* season, the season of highest demand for plant protection service during the year. The same equipment could be used during the *rabi* season.

It is estimated that there are about 3,34,000 units of hand-operated and 21,600 units of power-operated equipment already available and the present sanctioned available capacity of 2,26,500 manual and 1,03,000 power-operated units on an eight-hour shift basis in the organised sector and about half the

capacity in the SSI sector would be able to cope with total demand. It may perhaps be repeated that the local plant protection equipment manufacturers are progressive and not static in their outlook and they continue to modify their production keeping in view the developments in the design of conventional equipment and designing of new equipment for dispersing newer types of formulations in the most economical manner.

Particulars of equipment	Number of units required
A. Manually-operated appliances	
1. Sprayers & dusters	15,00,000
2. Seed treating drums	67,630
3. Fumigation pumps	5,220
4. Mechanical bird scarers	6,400
B. Power-operated appliances	
1. Conventional power sprayers & dusters	40,000
2. Knapsack sprayers-cum-dusters	2,73,000
3. Seed treating drums	176
C. Aircraft	
1. Fixed-wing	121
2. Helicopters	9

With a view to keeping the application equipment in good working order, the States have undertaken the task of providing repair facilities to the cultivators by strengthening their mechanical staff and organising mobile plant protection vans. Major equipment manufacturers have also organised after-sales service and one firm contracts for maintaining the units sold by it at an annual charge, in addition to supplying spare parts at cost.

ADMINISTRATIVE PROBLEMS

The task of promoting the concept of the ability of man to protect crops from the ravages of pests and diseases by various

methods under his control in a country with thousands of years of historical background of growing crops subject to frequent vagaries of weather and the fatalistic attitude towards the impositions of Nature is indeed formidable. The phenomenal results of the institution of pest control with modern insecticides particularly the outstanding success achieved in the control of desert locust with BHC, malaria control with DDT and safe storage of foodgrains with EDCT mixture have gone a long way in establishing rapport between the plant protection agency and the farmer. Elimination of such chronic pests as the Deccan wingless grasshopper, the Phadka grasshopper and rice bug in several widely separated parts of the country have helped in spreading the gospel of plant protection. It can be said without any fear of contradiction that once a cultivator has used plant protection measures on his farm or homestead, his conversion is of an enduring nature and he becomes the centre of future activities for development of plant protection in the area.

The administrators at different levels have responsibilities of varying nature. One of the foremost tasks is to organise large-scale campaigns for the control of epidemics or endemic pests since action on a community basis is necessary. Organisation of such campaigns involves working through District and Block Development Boards, Panchayat Samitis and other private agencies as also the local officials. In certain situations recourse has to be taken to the provision of the Pest Act as a campaign once instituted has to be executed methodically and in a thorough manner. Timely action for suitable canvassing at the local level, procurement of inputs like pesticides and application equipment, intensive training of the technical personnel at various levels and the public concerned, arrangements for publicity material and public relations, getting necessary notifications issued under the State Pests and Diseases Act and streamlining the organisation must be taken.

Similar arrangements would need to be made at the State level where specific attention will have to be paid for organising distribution of pesticides and equipment through the

departmental, cooperative and private agencies with the largest number of sale points. Funds for administering a trading account for the purchase and sale of pesticides and application equipment as also for advancing loans to the farmers will have to be arranged either from the State or Central Government or Reserve or private banks. Quantum of subsidy on the sale of pesticides and equipment on crop and area bases or on operational charges for aeroplanes both in the public and the private sectors for the application of pesticides will have to be determined.

At the Central level, in addition to shouldering responsibilities of a direct nature in connection with the institution of plant quarantine on imports and issue of phytosanitary certificates on export commodities, and survey, warning and control of desert locust in the scheduled desert areas, it is necessary to organise coordination of effort of Central, State and local agencies, corporate bodies, trade and industry and the farmers in different areas of plant protection. Targets of coverage of area in consultation with the States and their local bodies must be fixed and achievement of results reviewed. Supply of inputs like pesticides and application equipment by local production or through imports directly or through established industry must be ensured. This would involve working out the total requirements of pesticides and application equipment for the country by obtaining the requirements of individual States, maintaining liaison with the industry with a view to their local production or import. The latter would involve ensuring supply of raw materials, diluents and other formulating agents to the industry. It will also involve arrangements for proper allocation of foreign exchange or facilities for import under credit arrangements or trade agreements or barter for import of raw materials, technical grade materials and formulating agents for pesticides and application equipment. In this context, it will be also necessary to make provision for import of fixed wing aeroplanes and helicopters of the suitable type both for the public and the private sector. Arrangements for laying down

specifications for pesticides in the technical grade and their formulations have to be made and it would be necessary to ensure that the consumer gets the required inputs of high quality and needed quantity at the right time. Sorting out of the agricultural aviation programme in the State with the assistance of the planes of the Government of India and in the private sector is also necessary.

In addition to the various standing and *ad hoc* inter-ministerial committees for looking into the details of the various aspects pointed out above, liaison with the trade is maintained through the Pesticides Association of India, the Pesticides Formulators Association of India (Small Scale Industries), the Pest Control Operators' Association, the Aeroplane Operators' Association, etc. The proposal for organising a statutory plant protection board consisting of officials and non-officials to serve as a clearing house for various matters connected with the scientific, manufacturing, trade and operational aspects of plant protection has been mooted and is under examination. Appropriate action for organising an Indian Association for the Advancement of Plant Protection is under way.

As a dynamic extension programme must needs be based on sound research, liaison is maintained with various research institutions at the Central and the State level directly and through various coordinating agencies like the Coordinated Research Projects on different commodities like rice, wheat maize, jowar, bajra, pulses, cotton, jute and sugarcane of the Indian Council of Agricultural Research, various commodity development councils of the Ministry of Food, Agriculture, Community Development and Cooperation, the Plantation Crop Boards and with private research organisations like the United Planters' Association of Southern India and the Tea Research Association.

FUTURE OUTLOOK

There is widespread consciousness of the role of plant protection in increasing agricultural production. It has come to

be considered as important as the other three factors of production: improved seeds, fertilizers and irrigation. Progressive cultivators have introduced its essential elements in the agronomic routine for raising crops. The foundations of ever expanding pesticides and application equipment industries have been laid. Necessary machinery has been set in motion for exercising the required controls for its smooth and unimpeded development. Substantial progress has been made in establishing plant protection work in its many facets. However, the gigantic programme envisaging several fold increase in work output to achieve the higher targets that have been set for plant protection is likely to throw up many problems that will have to be tackled as they arise. Production, movement and distribution of poisonous chemicals (pesticides) and entrusting them to the villagers would need launching of a huge educational programme for imparting knowledge of their proper use. The large quantities of equipment required for the purpose would have to be constantly maintained and kept in good working order. A continuous supply line will have to be established for the raw materials, intermediates and formulating and packing materials for the pesticide and application equipment industries. Rigorous statutory quality control may have to be instituted.

With the rapid strides that are being made by modern technology, the plant protectionist could not afford to remain static but will have to keep abreast with the latest techniques developed by research workers. Not before long, he may have to adopt for field use such newer methods of pest control as ionising radiations, sterile male technique, chemical lures, sex attractants, chemosterilants, ultra low volume spraying, etc. The need for making arrangements for in-service training of the field staff at a high level of efficiency is apparent with an alround intensification of effort and with all concerned pulling their weight the future outlook for plant protection looks very hopeful and it is most likely to contribute its full share in achieving self-sufficiency in the production of food grains and high targets set for other agricultural commodities.

Appendix I

Production of Pesticides in India

(Tonnes technical grade)

Pesticides	Capacity sanctioned	Current production	Capacity under negotiation
Chlorinated Hydrocarbons			
BHC including lindane	10,700 (3)*	10,000	38,100 (13)
DDT	4,200 (2)	2,630	3,000 (1)
Toxaphene	250 (1)	5	—
Endrin	—	—	1,000 (1)
Organo-phosphatics			
Parathion	700 (2)	5	2,500 (2)
Malathion	1,000 (2)	750	1,100 (2)
Dimethoate	220 (1)	5	780 (1)
Others	—	—	5,362 (5)
Carbamates			
Carbaryl	—	—	7,000 (2)
Thiocarbamates			
Zineb, Ziram	2,500 (2)	1,600	2,624 (4)
Sulphur) dust Wettable)	6,500	6,000	—
Organo-mercurial salts	111	15	—
Organic seed dressers (Thiram)	300 (1)	80	1,254 (4)
Copper salts			
Copper oxychloride	2,284 (4)	1,500	—
Copper sulphate	5,250 (9)	5,200	—
Rodenticides			
Zinc phosphide	300 (3)	300	150 (1)
Coumarin compounds	50 (2)	20	—
Fumigants			
EDB, Methyl bromide, ED/CT mixture, Aluminium phosphide	5,000 (5)	50	300 (1)
Weedicides			
2, 4-D, 2, 4, 5-T etc.	100 (1)	60	4,200 (5)

*Figures in parenthesis indicate the number of plants/schemes.

Appendix II

Foreign exchange released for import of pesticides and raw materials for manufacture of pesticides

<i>Year</i>	<i>Rs. in millions</i>
1961-62	14.00
1962-63	14.00
1963-64	24.30
1964-65	18.25
1965-66	27.88
1966-67	132.90
1967-68	149.00

MECHANISATION AND IMPROVED FARM IMPLEMENTS

C. S. SRIDHARAN

PRESENT POSITION

Old Implements

The requirements of the farmer of improved farm implements necessary for successful agricultural operations have remained totally neglected for many years. Indigenous implements developed in the ancient past and still widely used are slow and inefficient. The most commonly used implement even today is the wooden wedge plough. Because of the poor design it does not penetrate into the soil properly, with the broken soil falling back on the undisturbed, consolidated ground, pressed by the moving plough sole. The sectional area being less, to get the same depth, the succeeding run has to be close to the previous one and so the coverage is poor about 0.2 hectare, at the most, in a day. To get a seed bed over a hectare with such an implement, at least five operations occupying ten days, would be needed. There are about 38 millions of them. Besides these there are other devices for water lifting which also have poor performance and efficiency. The prevalent system of direct sowing, either broadcasting or sowing behind plough furrow, results in seed wastage of over a lakh tons for every extra pound of seed used per acre. By using these implements millions of hectares do not receive proper and timely treatment and productivity is seriously affected. It is, therefore, necessary to replace them by the new and improved implements as quickly as possible.

Added to the inefficiency of the implements, power availability for timely agricultural operations is also inadequate. Though 80 per cent of the population live in rural parts only about 50 per cent are engaged in agriculture. Of this the effective farm labour in the age group of 15-60 account for about 5 million H.P. Power from the 33 million pairs would work out to about 25 millions. The engine power so far introduced may be in the region of about 5 millions bringing the total to 35 million H.P. The power per acre works out to a tenth H.P. which is available only for about five hours, making due allowances for resting period, etc. In advanced countries like U.S.A., Japan, etc., this power is 10-15 times more and is available for full 24 hours and is one of the important contributing factors for high agricultural productivity in those countries. Thus, in any programme of intensifying agricultural production appropriate provisions for more power and efficient implements which would relieve the stress and strain on man and animals and be capable of giving greater turnover should form an integral part of the programme. The approach of the Government to meet this problem is two-fold : (1) to design, test, improve, demonstrate and popularise improved, manual and bullock-operated implements; and (2) to augment the power by encouraging the use of mechanical and electrical power and other power driven appliances.

New Implements

Design and development and testing have been carried out in the past three decades but in a limited way, in a few states. In view of the importance of this programme, the Government of India established a Research and Testing Station in every State for designing new implements, to provide testing facilities for manufacturers and to assist them to improve the quality and standards of implements produced by them. The work carried out so far has brought forth a number of useful implements.

Tillage

A seed-bed which receives the seeds and nurtures the plants should be properly conditioned to sufficient depth and be free from weeds for good plant growth. This can be achieved only with appropriate implements. Mouldboard ploughs can work 12-20 cms. deep inverting the surface vegetation to add to the soil humus and soil is left in a state where it can absorb maximum moisture. Ploughing becomes a once-over operation with such ploughs and could be followed by other lighter and wider working implements capable of reducing the clods, levelling the surface, removing the weeds and leaving the soil in proper shape for sowing. The expanding cultivators and the blade, disc and peg tooth harrows for dry land, trawlers and puddlers for wet lands have proved very useful. With a suitable combination of implements the period of operations can be reduced to less than half, with an average saving of Rs. 30 per hectare.

Sowing

Automatic four-row seed drills now available give four times more turnover, uniformity in spacing and saving of seeds. By drilling inter-row weeding is made easier. Wheel hoes for dry lands and rotary weeders for wet lands have given satisfactory performance to remove weeds economically. Placement of fertilizers below and away from seeds has given 10 to 25 per cent higher yields. Injury to seeds by direct contact with fertilizers is averted. Drills which can drill seed and fertilizer at the same time are available though they require more improvements. They give outturns of 1-2 hectare at a cost of Rs. 5 per hectare as against Rs. 20 by prevailing practices.

Irrigation

Improved mhothe wheels, automatic tilting buckets, improved circular mhothes and pumps have proved helpful in irrigation. Field levellers, ridgers, bund-formers and floats are useful for distributing irrigation water uniformly and with economy.

Soil and Moisture Conservation

For conservation of moisture in places of low rainfall areas and for conserving soils in high rainfall area, bunding and terracing are necessary. Ridgers, one-way ploughs, bund-formers, basin-listers, khenis and buck-scrapers come in handy and are economical for such jobs. Terracing by bulldozers has also been attempted successfully and economically in several places where labour is short.

Plant Protection

Sprayers and dusters deliver the chemicals on to the foliage with the required force and spread, enabling them to cover the plants effectively, causing maximum damage to the insects and pests. Mechanical and chemical bird scarers have reduced damage to the crops from birds and animals. Seed treating drums are used to treat seeds with chemicals before storage and to save them from rodent and fungus attacks.

Harvesting

Harvesting can be done with speed and efficiency with harvesters. A great deal of experimentation is required to evolve economic and efficient harvesters suitable to local conditions.

Processing

Other implements like cane-crushers, rice, hullers, wheat threshers, maize shellers, groundnut decorticators and chaff cutters have been tested and are becoming popular day by day.

Power Operated Equipment

The development of land to make it productive consists of a series of operations which vary with the conditions of the soil and terrain. In cultivable wastes clearance of shrubs, weeds and trees will have to be done with very deep ploughing

to break the hard subsoil and vegetable remnants. Where the lands are sloping gently they have to be levelled and bunded or bench-terraced on steeper slopes. Undulating surfaces need levelling for irrigation water to spread uniformly. For renovating tanks desilting will be needed. In all these heavy earth-work operations are involved and as they are beyond the means of human or bullock power, work of this kind was not attempted in the past.

Immediately after Independence the Government launched several schemes for raising food production. The Central Tractor Organisation was set up by the Government of India in 1947 with a fleet of 260 high-power crawler tractors. The State Governments also had smaller fleets of such tractors for hiring out to farmers for land clearance, levelling, bunding and desilting. Over 6 million acres have been reclaimed during the three Plan periods.

With increasing targets of soil conservation, the demand of the States for bulldozers has been gradually rising. As vast stretches of land still remain to be tackled and the scope for such work is great, it is estimated that over 4,500 bulldozers would be needed during the Fourth Plan.

Wheel Tractors

With the rapid increase in the labour requirements for the various developmental programmes, the shortage of labour on the farms during peak intensity periods, the rising cost of animals and the difficulties in maintaining them were some of the contributing factors to tractorisation. Wheel tractors were imported into this country from U. S. A., U.K., U.S.S.R. and other European countries and have been used under the grow more food schemes in the State Plans in the last two decades. Though initially these tractors were considered suitable only for dry-land cultivation, in recent years, these have also been used for wet-land cultivation as well by using wide-caged wheels in place of rubber tyres and discharge rows. In view of the

increasing demand indigenous tractor production has also been licensed and there are now five manufacturers producing tractors. There has been, however, a shortfall in production due to insufficiency in the imported components.

Tractors are being distributed to farmers on the hire-purchase system where the initial cost is met by the State Government and the same is recovered in annual instalments varying from 7 to 15. The States also maintain a fleet of tractors to be hired out to farmers on nominal hire charges varying from Rs. 20 to 30 per acre.

Power Tillers

These are small walking tractors fitted with air or water cooled internal combustion engines with two wheels and H.P. varying from 5 to 8. The roto tillers at the rear of the machine are operated by engine power and revolve at about 500 RPM. These are particularly suitable for wet-land cultivation where the smallness of holdings with intervening bunds and irrigation ditches would render the four wheel riding type difficult to work. Besides tillage they can also be used for power pumping, spraying, harvesting and transport with appropriate attachments. In the last few years about fifteen hundred tillers have been imported from Japan and are being used in different States. Production programmes are being contemplated by a number of private industries with the help of Japanese collaboration. M/s. Krishi Tillers of Hyderabad have already initiated production.

Irrigation Equipment

India has an extensive irrigation network extending to 80 million acres. About a third of this area is irrigated by wells and the remaining by canals and tanks. Though electrical power supply is being extended to the rural countryside on a large scale, for power-pump irrigation about 90 per cent of the villages will continue to depend on the diesel engine pumpsets

and indigenous water lifting devices depending upon the available financial resources for a long time to come. In the other areas, supplied by canals and tanks, lifting tackles for low heads are often needed to make up deficiencies in the supply of water. In the several projects, which have been initiated in recent years, improved implements for land preparation have great utility.

Centrifugal pumps from 2 to 6 in. with discharges varying from 60 gallons to 400 gallons per minute, for electrical and engine power have come into large-scale use in the past fifteen years in a number of States. With the facilities of loans and subsidies provided under the Grow More Food Schemes, aided by increased manufacture under indigenous industrialisation programmes and rural electrification, the demand has been rising year after year. Power-driven pumps have become very popular, as they are economical, giving an abundant and timely supply of water. Human as well as animal drudgery in operating the indigenous lifts have been largely eliminated.

Filter-point tubewells

Filter-point tubewells have become popular in States like Andhra Pradesh, Madras and Orissa. To be successful, the filter-point is to be placed in water-bearing, coarse sandy sub-soil-stratum and the static water level in summer should be well above the filter. The engine driven pumpset is fitted to the suction side at the ground level with a cylindrical foot-valve fitted at a convenient position. The cost of the filter-pipe line is about Rs. 400 and electrical or engine driven pumpset required for these cost Rs. 1,000 or Rs. 2,500 respectively. The advantages of these wells are that the costly masonry construction of open wells is not necessary and the construction of a well about 40 ft. deep can be completed within three days.

Deep-well pump

In a number of States the ground water-table is so deep that centrifugal pumps and water-lifts cannot be of much use.

Submersible and turbine pumps which are suitable for the deep water table conditions, and tube-well irrigation schemes with such pumps are on the increase in a number of States. Farmers' Cooperative Service Societies have been established to manage these units in Orissa, and creditable work is being done under the scheme.

Construction Equipment

With the vagaries of the monsoon, it is of great importance for us to develop minor irrigation on a big scale. Tube-well and open wells have to be constructed in large numbers. If the rate of construction is to be speeded up construction equipment, namely, drilling rigs and compressors would be required in large numbers.

OVERALL REQUIREMENTS AND COVERAGE

Requirements

With wide variations in crops, soils, climate, size of holdings, financial resources and draught capacity of animals, to assess the overall requirements of different categories of improved equipment and power suited to each region is not an easy matter. However, with certain assumptions an estimate on the basis of number of holdings in each size may be a possible approach. Assuming that farmers up to one acre limit would have to rely on manual power only, this group of farmers may need a set of manually operated equipment only. The total requirement would come to approximately 12 millions. Assuming a life of 6 years for each, the annual requirement would be around 2 millions. Holdings between 1 acre to 25 acres can be considered to be under bullock economy excepting the wetland holdings between 15-25 acres which are considered suitable for power tillers. In the former case for every 15 acres, one set of bullock drawn implements would be needed and in the latter case the remaining holdings might be considered for

bullock power. The total number of bullock drawn implement sets and tillers can be approximately placed at 25 millions and 7.8 lakhs respectively. Assuming a life period of 10 years in either case the annual requirements would be 2.5 million and 78,000 respectively. Holdings over 25 acres are considered economical for tractorisation, and at the rate of a tractor for every hundred acres, the total need for wheel tractors would be around 14 lakhs. Assuming life period of 10 years the annual need will be 1.4 lakhs which can be equally divided in two H.P. groups, one between 15-30 H.P. and the other 30-50 H.P.

In case of pumpsets also on similar calculations, the number needed for 30 million acres under well irrigation will be 3 million at the rate of one every 10 acres. Assuming a life of 10 years, annual requirements would come to about 3 lakhs.

The Coverage

As against an estimated total demand indicated above, the present utilisation forms but a small fraction, as indicated in the statement below :

S. No.	Implements or Machine	Based on livestock census				Estimated
		1945	1951	1956	1961	1966
1.	Wooden Desi Ploughs (in thousand)	27,306	31,796	36,615	38,324	40,000
2.	Iron Ploughs (in thousand)	481	931	1,367	2,299	5,000
3.	Persian Wheels (Nos.)	N.A.	N.A.	N.A.	630,106	630,000
4.	Electric Pumps (Nos.)	8,561	26,174	46,930	160,154	550,000
5.	Oil Engines (Nos.)	12,062	82,477	122,230	299,944	400,000
6.	Tractors	4,524	8,353	20,980	31,005	50,000
7.	Sugarcane crushers	489,521	562,030	563,769	622,500	670,000
8.	Tube wells Deep & Shallow, Government Private, Cooperatives etc.	3,500 (Pre-plan)		9,000	11,500	17,565

It may, however, be noted that there is an increasing trend in the take-off from Plan to Plan. The percentage of iron ploughs to wooden ploughs which was 3.8 per cent in 1956 rose to 6.4 in 1961 and is now estimated at 12.5 per cent. Similarly,

the use of all other machines also has recorded a marked rise. In case of bullock drawn implements the spread in U. P. is highest. This has been due to the fact that there was a well coordinated programme of design, popularisation and extension. Punjab with its larger farms and machine-mindedness is ahead of other States with regard to tractorisation and tube-wells with a total of about 10,000 machines and 6400 tube-wells.

Besides tillage, tractors are being used for threshing of wheat for which suitable threshing machines have been designed and are being manufactured in large numbers. Utilisation of electricity for irrigation has made great progress in Madras State which has now the largest number of electrically operated pumpsets, approximately 3 lakhs, and almost every ayacut is fitted with a number of electrical pumpsets which ensure adequate water supply for three crops. Diesel pumpsets have become extremely popular in Maharashtra where over a lakh of them are in operation.

STEPS TO INCREASE UTILISATION OF IMPROVED IMPLEMENTS

In view of the important role of implements and machines they should be popularised and made available to farmers in increasing numbers. The following steps are necessary in this direction:

Demonstration

The spread of improved agricultural implements in the country can be speeded up with suitable programme of demonstration to educate farmers on the superiority, usefulness, operation and performance of implements, as compared with the older tools used by them. Attempts have been made in recent years to intensify demonstration under field conditions. Several States have established demonstration squads for showing implements at work and have achieved a substantial measure of success. Because of the higher initial cost of the improved implements the need for demonstrations to prove their economy in the long run becomes all the more important

in popularising them. Popularisation rests on the soundness of such demonstration programmes. It is, therefore, necessary to conduct comparative field demonstrations involving as many implements as are available and demonstrating the advantages of using the new implements in the area. Demonstration plots will have to be prepared and managed by the farmers up to the final yield stage. Farmers will be able to observe at first hand the operating qualities of each machine and the resulting yields. They will be able to judge which implement is most productive. Manufacturers whose implements are not performing well will be under pressure to improve them. Competitive pressures are the best known techniques to bring about improvement quickly and naturally. These encourage improvements in a positive manner, recognise the manufacturers' freedom and accomplishments and protect their design rights. The extension workers' role is to arrange, mark off plots and manage the demonstration.

Training

The rural artisans who have all along been producing and servicing the farmer's needs of implements have an important role to play in the popularisation of new implements. For training them there are now fifty workshop wings which are to be increased to 70. A well conceived expanded training programme in servicing and operation of improved implements is very necessary for them. Once they are trained they should also be provided with employment opportunities in rural areas. The small scale industries located in urban areas, should be pressed to utilise the services of these trained artisans for servicing and Government on their part can also examine the possibility of utilising them on a commission basis for introducing new improved implements to the farming community.

The ultimate success of any programme for introducing and popularising new implements and mechanisation depends on the skill and ability of the different categories of engineering

and non-engineering staff engaged in the work. An intensive training programme is necessary for all of them. The lack of skill and understanding of the improved equipment is an ever-present problem in mechanisation. If an implement is not properly adjusted and operated it will not produce the desired results. Therefore, training programmes have to be worked out for supervisory technical officers, the staff handling demonstrations as well as for farmers. The whole training programme will have to be job-oriented and of sufficient duration.

Quality Marking

It is necessary to see that the quality of implements does not fall because of the multiplicity of manufacturing firms. Quality marking schemes have to be implemented in every State. Only implements well tested by the Research, Testing and Training Centres should be approved for manufacture and also every item manufactured should be subjected to periodical checks by a suitable Government agency which should stamp them before their distribution is permitted.

Credit Facilities

Credit facilities are now available for the purchase of costlier machines like tractors and pumpsets under Taccavi Loans or from Cooperatives. Hire-purchase schemes are also in operation in States for such equipment. Subsidies varying from 20 to 50 per cent are also available for implements and pumpsets. These facilities will have to be continued until farmers realise the importance of implements and are in a position to do without such aid and until the demonstration machinery gets fully organised.

Group Organisation and Cooperatives

While certain simple tillage implements for small farms can be purchased by most of the farmers, machinery for medium and larger farms would require a higher capital investment. It would,

therefore, be necessary to have cooperatives or group organisation for the purchase of such tools and to make them available to those who require them on a hire basis. This would reduce the depreciation cost over many operations and also provide farmers the use of such implements which they cannot afford. It is also necessary on the part of Government to provide at suitable points, centres where farmers could hire such equipment at reasonable rates. Service cooperatives should assume increasing responsibilities for stocking improved agricultural implements and making them available.

Standardisation

Standardisation will be necessary to facilitate mass manufacture at lower cost, to maintain standards and quality of implements and to provide spares easily. The Indian Standards Institution is currently engaged in this task and has standardised a number of improved implements. The work of the Indian Standards Institution should assure that the production units bring out goods according to the prescribed standards. The Indian Standards Institution should also expeditiously standardise the wearing components.

Research

The Research Centres for implements established in each State should constantly endeavour to improve the quality of implements by intensive testing. They should also maintain close liaison with firms who should also be provided necessary guidance to manufacture new implements. Prize Award Schemes for designers and inventors would be desirable to bring out new machines.

STEPS TO INCREASE MECHANISATION

Training

As full mechanisation involves the use of complicated machines and an understanding of their mechanism, an

expanded training programme on servicing and operation is very necessary for different categories of staff—operators. These have to be initiated in other States also. For the higher category of personnel, the Government of India established a training centre at Budni in 1955 and another at Hissar in 1963. These two have done valuable work and have trained over 1000 persons. There is need for strengthening and also for more such Centres, at least one in each Zone.

Mechanised Farms

Government started in 1959, a mechanised farm with an area of 12500 hectares in Suratgarh with the help of machinery gifted by U.S.S.R. Another was started in Jetsar in 1963. Atleast one such farm might be started in each State. If such big blocks are not available, they could be started even on smaller blocks of compact size which would be much more easily manageable.

Service Centres

More service centres should be established in rural areas where the number of tractors is high to encourage most efficient utilisation of machines.

Contract Services

There is a great scope for contract farming in this country. Several private owners of tractors after completing their own work hire them out to farmers in compact blocks. This is turning out to be a profitable business. Adequate provisions should be made in plans to bring about contract farming to a greater degree. Contract work may have to be planned right now and agricultural graduates could be helped to undertake the work. With their small holdings farmers will not be able to go in for tractors unless credit facilities are made easily available to them. Large sums would be needed for the purpose.

Mobile Workshops

In order to maintain the tractors in good condition, periodic check up by competent technicians would be necessary. Mobile workshops would be of great help in this direction. Such units should also be developed in the country itself. After sales, service and supply of spares are becoming difficult, firms should be persuaded to keep adequate spares in sufficient numbers. Production of such spares should also be taken up in this country on a large scale.

Farm Machinery Industry

For the manufacture of improved manually operated and bullock-drawn equipment, there are about three hundred small scale industrial units scattered in urban areas in different States of the country. Manufacturers have also been approved in several States to fabricate simple implements. There are about a dozen State Government Workshops which are producing quality implements. All these are engaged in the production of tillage implements, hoes, cultivators, harrows, etc. The production capacity of all these, though it has not been estimated precisely, appears to be still below the targetted capacity and there is scope for expanding it. Hitherto under a system of subsidy Government used to be the largest purchaser and so the required demand could be accurately estimated by manufacturers. Now that these subsidies are to be lifted, Government controlled distribution will not be possible. An intensive demonstration programme will have to be taken up to educate the farmers on the improved implements, so that they may take to them as speedily as possible.

Tractors are being produced indigenously since 1961. Five big firms—Tractor and Farm Equipment Co., Madras, Tractor and Bulldozers Ltd., Baroda, International Tractor Co., Bombay, Escorts at Faridabad have been licensed to produce in all 30000 tractors with matching implements annually. The first four firms are to produce 7000 each and the last

2000. All these together, however, produced only 25 per cent of their manufacturing targets in 1966. This low out-turn has been one of the reasons for the high cost of Indian tractors. Factors responsible for the low turnover require to be analysed periodically and remedial measures taken to step up production and to bring the prices of the tractors within the means of our farmers.

For small tillers seven firms have been licensed to produce annually 80,000 units. But only the Krishi Tillers of Hyderabad have made a beginning. About five hundred units have so far been produced by them.

For the pumpsets private industry has established itself well and many hundreds of firms are now in this line and it is believed that all our future requirements would be taken care of.

In case of plant protection the average annual estimated demand is about 6 lakhs for manually operated sprayers and dusters, 20,000 for power driven units and a lakh for knapsack power units. The estimated production capacity is 50 per cent in case of the first and 1500 and 15000 in the other two cases. Though self sufficiency can be attained in case of manually operated units in the other two cases more production units to produce the low power light weight petrol engines are necessary.

FOURTH PLAN PROPOSALS

The implements programmed began to receive attention only during the Third Plan and so the financial provision made for the schemes has generally been low in all the States. The production of power operated equipment faced difficulties and fell behind targets due to the inadequacy of foreign exchange and imported components. The implements programme has to be built around intensive field demonstrations to educate farmers, and attention to this has been lacking. This work was in the hands of the Village Level Workers who had always too many other jobs to do. Only trained specialist staff can take up such technical demonstration programmes in a convincing manner. Training programmes and credit facilities

available were inadequate. The flow of orders to manufacturers generally was not phased properly with the result a good production schedule was absent, which naturally affected the distribution and supply. There was no suitable organisation at district levels to plan and execute the programme.

For the Fourth Plan, the Working Group has made the following important proposals to remedy the several deficiencies with a financial outlay of Rs. 80 crores.

(1) For planning distribution of implements and machinery and to look to repairs, maintenance of machinery there should be a workshop in each State with a mobile repair unit.

(2) For demonstrating and popularising and repairing simple implements there should be a workshed in each block with a mechanic.

(3) The 17 Research Centres should be continued by I.C.A.R. and two of them at the I.A.R.I. Pusa and Coimbatore should be strengthened for carrying on advanced fundamental and applied research.

(4) There should be a public sector project for manufacturing Power tillers and low H.P. tractors.

(5) A revolving fund should be provided for the supply of machinery on hire and hire-purchase system in each State.

(6) For the training of rural artisans the number of training centres should be increased to 70 centres from the present 40.

(7) To meet the increasing demand for agricultural engineers, Agricultural Engineering Colleges should be established in Agricultural Universities.

(8) Service Cooperatives should be organised for stocking and supplying implements.

(9) With regard to supply of implements, the following targets have been provisionally fixed:

(i) Sets of improved implements sufficient for 20 per cent of the farming families.

(ii) A total of 1.5 lakhs of tractors, 4 lakhs of tillers, 4500 high H.P. crawler tractors, 3 lakhs of diesel pumpsets and 7.32 lakhs of electric pumpsets and 6

lakhs of manually operated sprayers and dusters and 1 lakh power units.

AGRO-INDUSTRIES CORPORATION

With the object of bringing industries and their products into agriculture and also to utilise the products of agriculture in industry, agro-industries corporations are proposed to be established in different States. The Government of India has provided a sum of Rs. 5 crores during 1967-68 for implementing this programme, and the States and the Centre are to share the capital equally. The Corporations have come into being in Assam, Maharashtra, Bihar, Uttar Pradesh, Haryana, Madras, with other states to follow. There would be a more-coordinated approach to the problems pertaining to farm machinery, inputs in agriculture, which are urgently needed under the new strategy for increased agricultural production.

A variety of services will be undertaken for increasing agricultural production such as supplies of agricultural raw materials to industries, credit facilities to farmers and agro-industries, contractual services to farmers, hire-purchase schemes loans, development of processing, marketing, etc. These corporations have a great role to play in advancing farm mechanisation and industrialisation based on agriculture.

CONCLUSION

A well conceived, new strategy has now been adopted all over the country to maximise agricultural production. High yielding varieties of paddy, wheat, maize, jowar and bajra are to be grown over 32.5 million acres in areas having assured irrigation facilities and rainfall.

The recommended cultural practices for achieving best results include (1) the preparation of a smooth fine level seed bed, which permits some water-management techniques; (2) precision-sowing with fertilizer placement at desired positions; (3) effective weed-control and plant protection; and (4) timely harvesting, processing and proper storage.

As farming becomes intensive and specialised, special equipment would be needed. For achieving these objectives in time and to the desired specifications, appropriate implements are a dire necessity. Efficient improved implements have been evolved and are in production for both dry and wetland cultivation. Deep working intercultural hoes are available for effectively destroying weeds. Ferti-seed-drills have been designed for controlled placements. Concentrated efforts are on to improve them and bring down the cost. For uniform water application and conservation of moisture suitable bullock-drawn implements can be used economically but as large new project areas require treatment, tractor-drawn implements are essential for speedier work. Research for development of machines for processing, harvesting and threshing and techniques of controlled water application and measurement will have to be intensified.

The improved equipment is efficient because it reduces the cost of production, with greater outturn and increased grain production through timely operation, and also because it reduces the strain and drudgery. It helps to protect and preserve the seeds, and maintain their quality.

The proper combinations and utilisation of the many types of equipment at the right time for the right job represent the key factor in intensive agriculture. The machinery input requirements for the above programme have been estimated and with the establishment of Agro-Industries Corporation, there are bright hopes that traditional agriculture will soon be transformed into modern scientific agriculture.

AGRICULTURAL RESEARCH IN INDIA

T. R. MEHTA

THE BEGINNINGS OF AGRICULTURAL RESEARCH

Several unsuccessful attempts to introduce western farming techniques to improve Indian agriculture over a long period led the Government of India to the realisation that only the scientific study of the conditions of farming and experiments in agricultural practices in the Indian context would lead to any real improvement. Dr. Voelcker, an agricultural scientist who was invited to India in 1889 to advise on the steps to be taken to improve agriculture, stressed the need for research and this was later emphasised by the Famine Commission of 1901 and the Irrigation Commission of 1903. Till the turn of the century, however, the provincial departments of agriculture were small and were engaged largely in the collection of statistics of the area and production of crops and were little concerned with research. The first research institution to be set up in the country was the Central Research Institute set up at Pusa, in Darbhanga district of Bihar, in 1905 as a result of Lord Curzon's initiative. It was renamed the Indian Agricultural Research Institute (IARI) and transferred to New Delhi in 1936. The IARI obtained the status of a university in 1957.

The Government of India was fully conscious that a central institution alone was inadequate to develop agriculture throughout the country and that it was necessary for any real progress to supplement its work by a number of agricultural colleges and research institutions in different parts of the country, operating under the administrative control of the State Governments. With this end, colleges of agriculture were established or reorganised at Poona, Kanpur, Nagpur, Lyallpur (now in West

Pakistan), Coimbatore and Sembur. A separate department of agriculture was also constituted in most of the provinces and a scientific staff employed.

On the recommendations of the Royal Commission on Indian Agriculture (1928) the Imperial Council of Agricultural Research (ICAR) was set up in 1929 to promote, guide and coordinate agricultural and animal husbandry research throughout India. Later it became the Indian Council of Agricultural Research. The Council functions as an important forum for discussing problems of agricultural research and general agricultural policies of the country as a whole and also serves as an advisory body to the Government of India in matters relating to agriculture. The objects of the Council are to undertake, aid, promote and coordinate agricultural and animal husbandry education, research and its application in practice, development and marketing and to act as a clearing house of information, not only in regard to research but also in regard to agricultural and veterinary matters generally.

The Council does not possess any research institution of its own, but sponsors agricultural research in conjunction with the Central and State Governments at the central and state research institutions, universities and recognised private institutions. The Council's efforts are largely directed towards initiating research and undertaking pilot developmental work where necessary.

In developing its programme of research and scrutinizing and approving research schemes, the Council functions through a Governing Body, a Standing Finance Committee, an Advisory Board, a Board of Research and a number of scientific and other committees. The Council also coordinates the activities of the Central Commodity Committees relating to research and cooperates with them in initiating, promoting and undertaking schemes in fields of common interest.

The Central and State governments also expanded their research organisations. The Government of India strengthened the existing institutes, viz., Indian Agricultural Research Institute, New Delhi, Indian Veterinary Research Institute, Izatnagar (U.P.) and Sugarcane Breeding Institute. To deal with

important commodities, new institutes were established such as the Central Rice Research Institute, Cuttack, Central Potato Research Institute, Patna (later moved to Simla), Sugarcane Research Institute, Bhadrak (Lucknow), Vegetable Breeding Station, Kulu, Central Soil Conservation Research-cum-Training Centres (4), Arid Zone Research Institute (Jodhpur), and Grass and Fodder Research Institute, (Jhansi). Besides main agricultural research stations located in a common campus with the Colleges of Agriculture, the States set up on their own initiative a number of main and branch research stations for research on particular crops financing them from their own resources.

Support for research on a number of major crops was provided by the Central Commodity Committees, which were established by statute to attend to the special problems of a few major crops. Some of these Committees were empowered to utilise resources from a special cess on their respective produce on the basis of processed units and had considerable resources. The Indian Cotton Committee which was the earliest of these Committees was set up in 1923 and committees for Sugarcane, Tobacco, Oilseeds, Jute, Coconut, Lac and Arecanut were established later. Some of the Committees received direct assistance from the Ministry of Food and Agriculture. The work of the Committees in assisting research and bringing about technological advance in relation to the production and marketing of these commodities has been quite significant.

A major defect of the commodity approach to agricultural research was the neglect of many important problems which transcend commodity fields, such as problems of soil improvement and management, agricultural engineering, farm management and economics, improved utilisation of agricultural resources, home science, etc.

The ICAR meets twice a year to review the progress of research schemes financed by it and to initiate new research projects, or to strengthen research already under way. It has effected a measure of coordination of research, but the coordination was however, far from complete. The State Departments of Agriculture were free to formulate their own research programmes and

this led to a duplication of efforts and failure to make good use of the results of research conducted elsewhere. These defects were pointed out from time to time both by agricultural experts and by administrators. Though the Central research institutions were expected to concentrate on problems of a fundamental nature and of regional or national importance, much of their work was in reality not different from the work of state institutions.

REGIONALISATION OF RESEARCH

Uncoordinated research in Central and State institutions, the commodity approach and the limitations of the scope of research due to State boundaries led to the duplication of research, imperfect utilisation of research findings and to waste. The Centre sought to provide leadership in the planning of research programmes and in evolving policies transcending State boundaries. An integrated approach to the problems of a region as a whole as well as programmes of cross commodity research were needed. This was attempted through the establishment of a number of PIRRCOM Centres (Project for Intensive Regional Research on Cotton, Oilseeds and Millets) in 1957-58 for conducting research on the basic problems of the region in respect of cotton, oilseeds and millets and for the study of problems which could not be undertaken in the existing research stations. These centres were also designed to provide a mechanism for coordinating the work of the different State research stations in the regions served by them. The research programmes of PIRRCOM centres were guided by the specialist of the ICAR and the appropriate Commodity Committees.

The First Joint Indo-American Team (1954-55) which made a study of the organization and working of research institutions made a number of recommendations for improving the machinery for administration and coordination of agricultural research. One of the recommendations related to the appointment of coordinators for each major project or field of work. The coordinator who was to be an active senior research scientist working in a Central or State research station, was to help

in the coordination of research through encouraging an interchange of working plans and ideas among scientists in planning experiments on a regional and unified basis and in preparing joint reports.

The appointment of project coordinators for the major crops has resulted in significant advance in producing improved varieties of the major crops. The coordinators administer common programmes, with adjustments to meet local situations, jointly review data from the different centres of research, exchange views and breeding materials and formulate programmes for the next season. The efficacy of this procedure was first amply demonstrated in the case of the programme of hybrid maize and later in the case of sorghum, wheat and rice. The new hybrids of maize, jowar and bajra have been giving outstanding performances on the fields of farmers both in national demonstrations undertaken by research and extension workers as well as in commercial cultivation.

Another notable advance has been in the case of rice breeding where hybridization between selected Indian varieties (Indica types) and exotic varieties of Japanese origin (Japonica types) has resulted in the breeding of varieties which have a combination of the desirable characteristics of Japonica rices in respect of high yield potential (due to high response to heavy application of manures and fertilizers without the crop suffering from lodging) and of the grain quality of Indica rices. The better standing ability of the hybrids and their response to heavy fertilization have opened up new frontiers in rice production.

Excellent work on the breeding of wheat resistant to rust has been done at the Indian Agricultural Research Institute under the able guidance of Dr. B. P. Pal. Coordinated trials have revealed some varieties of wheat having wide adaptability combined with high yielding quality and other desirable features. Special mention may be made of the dwarf and semi-dwarf varieties of wheats from Mexico which have given very high yields and which are being further improved for grain quality through hybridization with Indian wheats.

In order to ensure a satisfactory organisation of research the First Joint Indo-American Team and subsequently the Second Indo-American Team (1959) and the Research Review Team (1964) recommended that the ICAR should become the technical arm of the Ministry of Food and Agriculture for the coordination of all research and related activities supported from central funds and that it should assume full technical and administrative control of all Central Agricultural Research Institutes and all Commodity Committees and certain other research organisations financed by the Government of India. This recommendation is now being implemented.

STRENGTHENING OF RESEARCH IN THE STATES

Since 1929 the States have greatly expanded their research organisation partly with the assistance of the ICAR and partly from their own resources. Still there is need for further expansion of research both in respect of programmes in operation and for research in neglected fields. The joint Indo-American Teams recommended special allocations of central funds to the States on the basis of continuing and long-term grants. The organisation for research in the States consists of a number of research sections, located either at a single centre or at different centres. These are placed under the administrative and technical control of research specialists. They are assisted by technical and other supporting staff and operate under the administrative control of the Director of Agriculture directly or a Joint or Additional Director of Agriculture (Research). In some States they are placed under the Principal of the College of Agriculture, who is *de facto* Joint Director of Agriculture (Research). The research set-up in the State includes sections dealing with the different disciplines or particular crops, such as agricultural chemistry and soil science, crop breeding, agronomy, horticulture, plant pathology and entomology. Crop breeding or improvement is the responsibility of specialists known as economic botanist or crop specialist, etc., operating more or less independently of one another, each concerned with a crop or group of crops assigned to him. The

programmes of the different research sections are coordinated by the Director of Agriculture or the Joint or Additional Director in charge of agricultural research who convenes annual or six monthly meetings to review the research in progress, the results achieved and to formulate the programme for the year ahead. In some States the officers concerned with developmental or extension activities are also associated with these meetings.

Research and its application to the field have suffered on account of the absence of a close link between research, teaching and extension. Administrative adjustments made from time to time have not been successful in bringing about the necessary degree of integration between research, teaching and extension. Much of the new knowledge flowing out of research fails to find a place in the instruction given by teachers in agricultural colleges because the personnel engaged in teaching and research are different and remain isolated from one another. Any teaching assigned to the research staff for improving the content of teaching and familiarising students with the latest technological developments and information is considered a burden and resented by the research staff. The teachers for their part are content to follow a prescribed syllabus to serve the purposes of the examinations conducted by universities. Neither research nor teaching under these circumstances are effective in solving farmers' problems. Much of the research tends to be academic, as it is not based upon a discriminating and particularised assessment of the situations obtaining in the field under a diversity of farming conditions. Success in research is judged on the basis of the number of papers produced by the worker rather than the extent to which the results of research find application in the field. The efforts to streamline the administration in the States for integrating teaching, research and extension have not hitherto been effective.

AGRICULTURAL UNIVERSITIES

To suggest ways of linking up research, teaching and extension and to make them effective instruments of agricultural development was one of the tasks of the First Joint Indo-American

Team. On the basis of the experience of the U.S.A. where a high degree of integration has been effected, the Team suggested the establishment of Agricultural Universities on the lines of the Rural Universities recommended earlier by the University Education Commission. The Team recommended the setting up initially on the same campus and in close proximity of a College of Agriculture and a College of Veterinary Science to which should be added, in due course, a College of Home Science, a College of Applied Liberal Arts and Science and a College of Technology using the term in the broad sense of engineering industries. A group of villages was to serve as a laboratory for the students. This was expected to help in making the teaching in the University farmer-oriented. The University was to have a responsibility for extension work in the villages attached to it. The Team recommended substantial grants in-aid by the Centre to the States for the development of Agricultural Universities.

Agricultural Universities have been established in Uttar Pradesh, Punjab, Orissa, Madhya Pradesh, Mysore and Andhra Pradesh. The establishment of these universities has raised several organisational and administrative problems. The greater part of research in the States has to be transferred to the university from the administrative control of the departments of agriculture. This is being done. Research programmes which form an integral part of development projects will, however, continue to be handled by the Agricultural Departments. The financial commitments of the States and the Centre respectively have to be spelt out. Similarly, the spheres of responsibility for extension work has to be allocated between the Agricultural University and the Department of Agriculture. No uniform pattern is possible and different systems are being worked out. At present extension efforts are intimately connected with service functions of the supply of production requisites; such as, improved seeds, fertilizers, improved implements and credit and to services, like plant protection. The latter will have to continue to be the responsibility of the departments of agriculture as it is inconceivable that the Agricultural University can take them over.

Until a separation is effected between supply and service responsibilities on the one hand, and extension (*i.e.*, education of the farmers through different extension methods such as demonstrations and other audiovisual aids) on the other, a certain amount of confusion is bound to prevail. Coordination has to be effected between the activities of the university staff engaged in extension and the departmental staff concerned with supplies and services.

RESEARCH IN FIELD PROBLEMS

While the integration of research and extension will help to make research better oriented to the solution of field problems, success in this direction will largely depend upon the extent to which research is strengthened in the country. Several expert teams have emphasised the need for considerably strengthening research. The resources developed to research at present are meagre, being hardly one-fourth of 1 per cent of our gross national income as compared to developed countries like the U.S.A. and Russia which are spending 2 per cent of their much larger gross national incomes on research. Financial allocations on a much larger scale are necessary for promoting agricultural research in the country.

Intensive agricultural programmes which are being implemented in selected areas in different parts of the country have brought home to extension and research workers the areas where extensive research is needed. For example, the increased use of fertilizers throws up the problem of weed control because the higher fertility of the soil resulting from fertilizer application also stimulates weed growth, calling for control measures through the use of weedicides or better implements for mechanical control. The more luxuriant growth resulting from fertilizer use is known to favour the incidence of diseases for which research must provide suitable control measures, or alternately evolve varieties which are more resistant to the diseases. In order that the farmer's investment on fertilizer, weed control and plant protection and other measures might give him enough attractive returns in the form of higher yields and better prices, plant breeding research must

produce varieties which are not only resistant to diseases but also highly responsive to fertilizers and satisfying to consumer tastes.

The implementation of the intensive agricultural development programme requires better training of extension workers on a continuing basis. A dynamic agriculture demands that extension efforts and advice should keep pace with the advances of science and technology. In many cases it has been observed that the farmer, once he moves from traditional agriculture, moves faster than the extension worker. Since research is often a slow and time consuming process it is essential that its programme should be large enough in size, able to anticipate the future demands of farmers and be in a position to solve field problems as these arise and are identified.

REORGANISATION OF RESEARCH

The recent reorganisation of the ICAR was a step forward in the development of research in the country as a whole. One of the major problems to be solved in reorganising research relates to the system of recruitment, conditions of service, pay scales and career prospects. At present these are not satisfactory enough to attract persons of superior intelligence and promise to agricultural research as a career. The relations of specialists to generalist administrators is as much a vexed question here as elsewhere in government and these will have to be regulated so as to attract and retain the best men and to provide them with unfettered freedom for productive research. Much remains to be done to provide adequate buildings and equipment. Budgetary procedures and restrictions have been found to be responsible for a great deal of frustration and waste of effort. The (Nalagarh) Agricultural Administration Committee has examined fully these questions and reported on them (1959). There is over-centralisation of authority and control points are far removed from the levels at which research is carried on.

Many areas of research have not received the attention which they deserve. Among these are the study of soil structure and physics, study of organic matter in relation to physico-chemical

and micro-biological changes in the soil, designing and testing of agricultural implements and machinery, soil-micro-biology, seed technology, use of radiation and other mutagenic agencies to bring about useful hereditary changes in crop varieties, studies on bacterial and virus diseases, the breeding of vegetable crops, nematology, weed control, water use for ensuring judicious utilisation of irrigation and several others. These will require a coordinated approach between the Centre, the States and the Agricultural Universities.

It has been recently suggested that a memorandum of understanding should be drawn up between ICAR or the Government of India on the one hand and the State Governments on the other defining in clear terms the respective spheres of responsibility in research as in other activities of the Centre and the States. Such a memorandum will help in demarcating the fields of different research institutions, the financial obligations of the Centre and the States and will help in evaluating the progress of research schemes.

The ICAR should develop strong regional research centres for the more fundamental types of research on regional and national agricultural problems which require substantial investment by way of qualified and experienced staff and equipment. The need for such regional centres has been felt for several years and establishment of PIRRCOM centres was a move in this direction. These centres were found inadequate for playing the role of regional centres and suffered from an unsatisfactory division of functions and responsibilities between the Centre and the States. The experience of the past will have to be utilised in drawing up the memorandum of understanding, to which reference has been made earlier. Administrative arrangements will have to be devised which will reduce inevitable personality conflicts to the minimum. These would be the main task of agricultural administration in relation to research during the next few years.

The major suggestions made above may be briefly stated as follows:

(1) A close link between research, teaching and extension must be established and suitable organizational steps to achieve this must be taken in order to make teaching as well as research effective in handling the problems of the farmers.

(2) Larger resources of the country should be devoted to research because the present programmes of research are inadequate.

(3) Separation should be effected between supply and service responsibilities on the one hand and extension on the other in order to enable extension workers to devote more time in field advisory work.

(4) Indian Council fo Agricultural Research should develop strong regional research centres for the more fundamental types of research on regional and national agricultural problems.

(5) A memorandum of understanding should be drawn up between I.C.A.R. or the Government of India and the State Governments defining in clear terms the respective spheres of responsibility in research as in other activities of the Centre and the States.

(6) The service conditions of agricultural research workers are not satisfactory enough to attract persons of superior intelligence and promise to agricultural research as a career. This should be remedied.

(7) Liberal decentralisation of authority is necessary so that control points are not far removed from the levels at which research is carried on.

(8) Several areas of research have not received the attention which they deserve. Among these are the study of soil structure and physics, study of organic matter in relation to physico-chemical and microbiological changes in the soil, designing and testing of agricultural implements and machinery, soil microbiology, seed technology, use of radiation and other mutagenic agencies to bring about useful hereditary changes in crop varieties, studies on bacterial and virus diseases, breeding of vegetable crops, nematology, weed control and judicious water use. These may be developed with the help of coordinated approach between the Centre, the States and Agricultural Universities.

AGRICULTURAL EDUCATION IN INDIA

S. K. MUKERJI

Beginning at the turn of this century agricultural education in India has expanded considerably and covers the school, college and post-collegiate stages of the educational ladder. Its development has been haphazard and uneven and is insufficient to meet present needs. The modernisation of Indian agriculture which is indispensable if India is to solve her food problem and raise the standard of her people requires a vast expansion of agricultural education both quantitatively and qualitatively. An attempt is made in this paper to analyse the educational needs of modernising agriculture and to suggest ways by which they could be met.

AGRICULTURAL EDUCATION AT THE SCHOOL LEVEL

At the school level in the existing system of education, agriculture forms part of the curriculum of studies in most general schools. It is one of the crafts studied in basic schools. It is an optional subject of study for the matriculation in the ordinary high schools and is one of the streams in four hundred out of the two thousand and odd multipurpose high schools in the country. Agriculture is taught as a vocation in a variety of special schools—a variety of schools such as Agricultural Schools, Manjri Schools or Rural Institutes and Gram Sewak Training Centres which have been established since 1952 in the wake of Community Development. Agricultural education up to the technician certificate of diploma level is imparted in the former institutions while the Gram Sewak Training Centres offer a two-year integrated course for village level workers in agriculture and extension.

The large number of schools and the variety of educational programmes have not assured the country a standard of agricultural education at the primary and secondary levels adequate to meet the needs of development. A reform of the school system of education lies along the lines indicated by the Education Commission 1964-66 on the place of agriculture in general education. The Commission has recommended that in India some orientation in agriculture should form a part of general education at the school stage and at the university as well as in teachers' training. In its view the period at school should be utilised to impart a sound general education with particular emphasis on mathematics and science to serve as a preparation for coping with the rapid scientific and technological changes that may be anticipated in Indian agriculture in the near future. The Education Commission has further recommended the establishment of specialised institutions which will provide vocational education in agriculture at the post-matriculation level. These institutions to be called Agricultural Polytechnics, are to be responsible for training the non-professional specialists required as farm-mechanics, farm managers, craftsmen and technicians in agro-industries, assistants in agricultural credit and insurance organisations, etc. The Commission has suggested that the courses at these Polytechnics should be directly practical in nature including a significant element of practical experience. They should be terminal in character and lead to specific and immediate employment.

AGRICULTURAL EDUCATION AT THE COLLEGE LEVEL

Education at the college level began with the establishment of the agricultural colleges in 1907 in Poona, Nagpur, Sabour, Kanpur and Coimbatore. Initially these colleges offered only diploma courses. It was only after their affiliation to provincial universities that they began to offer degree courses. The progress of collegiate education was extremely slow till 1947 and very fast since then. The acute shortage of trained agricultural personnel experienced during the First Five Year Plan led to a rapid expansion of existing colleges and the establishment of new

colleges. While there were only 17 colleges in 1947, today there are over 70 colleges of agriculture, 20 veterinary colleges with an intake of 11,000 students. A number of these colleges are private and this has resulted in a serious fall in the standards of agricultural education. At the college level the needs are (i) how to improve the quality of education, and (ii) how to attract a better class of students to take up agricultural studies.

There has been frequent criticism that agricultural graduates have little practical knowledge and that their training is too academic. One suggestion is that by introducing more manual field work during college it would be possible to turn out practical farmers. This is not always feasible. A second suggestion is that as medical or engineering graduates have to undergo house-surgeonship or apprenticeship as part of their training, agricultural graduates should be required to undergo practical training in Government farms or on the farms of progressive farmers, specially those who intend to take up farm management as profession is more practicable and needs serious consideration.

To solve the second problem a scheme of scholarships has been introduced to induce the better students to take up agricultural studies. Annually 250 scholarships have been offered to undergraduates beginning with the Third Plan. It is planned to cover 5 per cent of total admissions to the agricultural, veterinary, dairy science, agricultural engineering and home science colleges with such scholarships during the Fourth Plan. The State Governments and Agricultural Universities are also offering scholarships to students with first division marks who opt for agricultural or veterinary studies.

AGRICULTURAL EDUCATION AT THE POST-GRADUATE LEVEL

Post-graduate agricultural education begins with the institution of a post-graduate diploma leading to the associateship of the Agricultural Research Institute in 1923. Courses for the M.Sc. and Ph.D. were instituted in the principal agricultural colleges in the forties and in veterinary colleges in fifties. The major expansion in post-graduate education, however, took place only in

the last few years when the shortage of personnel with post-graduate training came to be keenly felt as a result of the launching of the Second Five Year Plan in 1958.

The First Joint Indo-American Team which examined the question of higher education in the field of agriculture recommended that a post-graduate institute should be developed in each State. There were regional pressures to upgrade existing undergraduate institutions to post-graduate status, and under these pressures though library and laboratory facilities and the qualified and experienced staff necessary to maintain adequate standards could not be immediately obtained, this was done. The results have been a lowering standards. The *Second Indo-American Team* suggested that before any college is permitted to start post-graduate courses an inspection team of experts appointed by the I.C.A.R. should assess the facilities available and fitness of the staff to guide post-graduate work. In practice this recommendation could not be implemented since Universities are autonomous and are at complete liberty to grant affiliation to colleges and confer degrees and the I.C.A.R. is not armed with statutory powers in respect of higher education like the Indian Medical Council. The University Grants Commission is charged with the responsibility for the maintenance of adequate standards in university education. To execute this function effectively in relation to agriculture joint ICAR, UGC teams have been set up for regular quinquennial inspection of the colleges as recommended by the Education Commission. The Universities have power to dis-affiliate colleges which do not come up to minimum standards. It is expected that these periodical inspections would serve to maintain standards.

The present admission capacity of the 30 post-graduate institutions which include the IARI and the constituent colleges of Agricultural Universities is 1400 per year. This considered adequate to meet the needs of advanced training during the fourth and the fifth five year plans. No increase in the number of post-graduate institutions is, therefore, contemplated under the Fourth Plan. Instead attention will be concentrated on improving the quality of post-graduate training by integrating teaching and

research and providing adequate funds for development. The areas of study in post-graduate institutions will be widened. Existing post-graduate departments in agricultural universities and post-graduate colleges will be developed as centres of advanced study in selected fields with facilities for study up to the doctorate level, on the pattern of advanced centres in the basic sciences and humanities set in Universities with the assistance of University Grants Commission. A provision of Rs. 2. crores in the central sector during the Fourth Plan has been suggested for the development of post-graduate education in agriculture in 17 post-graduate institutions which are not constituent units of Agricultural Universities.

AGRICULTURAL EDUCATION FOR FARMERS AND EXTENSION WORKERS

(1) **Farmer's Training:** As progress in agriculture depends ultimately upon the adoption by farmers of improved agricultural technology, their education in the new technology is a matter of fundamental importance. Farmers' education should aim at inculcating modern scientific attitudes to life and knowledge, spread new knowledge and continuously transmit to them the latest findings of research. Existing facilities for the training of farmers are inadequate and need to be expanded greatly.

The education of farmers is primarily adult education and must therefore go beyond the system of formal education. A majority of the adult farming population at present is illiterate. A knowledge of improved methods and practices can be effectively imparted to them only through demonstrations. Radio and television and other audio-visual aids can be utilised. Farmers cannot afford to experiment with new techniques and inputs since even a single failure could be ruinous and are therefore naturally hesitant to adopt new techniques. The extension agency should insure the cultivator against any loss due to the adoption of improved methods recommended by it. The recommendation of the extension agency should be based on sound research and demonstrated in practice on a large scale. This requires a close relationship between research and extension. The scheme

initiated recently of national demonstrations conducted by teachers and research workers has been highly successful in convincing farmers and has also provided research workers with unanticipated field problems which need attention.

The agricultural extension service as it has developed over the last 15 years is not adequate either in numbers or in technical and professional competence. There are some 60 million farmers in the five thousand and odd blocks in the country. There are roughly 12,000 farmers in a block which is served by 10 village level workers, *i.e.*, one village level worker for 1,000 farmers. This means a teacher-to-taught ratio, too large to be effective even for adult education purposes. As a result, extension personnel have not been very effective as educators.

The present extension service is, in the main, an agency for promoting and administering officially sponsored development schemes. The participation of farmers in the schemes is limited. The technical knowledge needed for this purpose is little and what is needed of the extension worker is a familiarity with the administrative details of schemes, supplies of inputs, loans and subsidies available. An able technical person in this service is apt to become rusty in a short while. If the extension service is to function as an agency for the education of the farmers and to maintain its technical competence, it is essential to separate the extension service from programme administration and to place it nearer to institutions of agricultural education. Agricultural universities are expected to take up the responsibility for extension education in a phased manner all over the country in close cooperation with the present extension agency which will continue to attend to service and supply functions till cooperatives or private agencies are able to take them over.

The Central Government in collaboration with State Governments has initiated a training programme for farmers and farm women during the last two or three years. This includes specialised training courses for a selected number of progressive farmers in agriculture and allied fields and course of training for farm women in agricultural production. The courses are given by the Gram Sevak Training Centres, Agricultural

Colleges and Government Farms where adequate facilities for practical training exist. The courses last for 10-15 days with about 40 participants in each course. About 40,000 farm leaders could be trained in this way each year. A shorter and more intensive programme of training is also given in the IADP areas for batches of 15 drawn from surrounding villages.

Mention should be made of the training programmes for farmers of State Governments. In Maharashtra the training of farmers is undertaken by peripatetic teams (two in each district) which hold training camps every month in different parts of the district. Some 2,400 farmers are trained in each district in a year. Eight short vocational courses of 15 days' duration have also been planned to train 400 farmers in specific fields in every district.

A training scheme has been introduced for women in blocks where Gram Sevak Training Centres are situated and the results are quite encouraging. 2,000 farm women have already been trained. This programme is being extended to intensive production areas.

Farmers are keen to learn the technical know-how of their profession and to practise the new agricultural technology.

The total cost of these farmers' training programmes of the Centre during Fourth Plan is estimated at about 5 crores.

Under the Fourth Plan it is proposed to extend training to cover at least 10 per cent of the 60 million farming families.

(2) Training of Extension Workers: The training of the V. L. Ws. is carried out in 144 Gram Sevak Training Centres spread throughout the country. These centres have trained 77,000 Gram Sevaks and 9,300 Gram Sevikas by the end of the Third Plan. The training period for Gram Sevikas has been increased from 6 months to 2 years. The major emphasis in the curriculum is on agriculture and allied subjects and extension education. The pre-service training phase is now almost over, and the main subject during the Fourth Plan will therefore be the qualitative improvement of the training given. To increase the technical competence of the present village level worker the following steps are proposed:

- (i) Encouraging village level workers who are eligible for admission to agricultural colleges to study for their degrees. 2,500 village level workers are expected to be covered under this programme.
- (ii) Instituting an advanced Diploma Course of a year in agriculture for old village level workers and upgrading all the Gram Sevak Training Centres by the end of the Fourth Plan. 21,500 village level workers will be carried under this programme.
- (iii) Increasing the number of refresher training programmes at all the centres so that all village level workers will be able to attend them.

For training the trainers and senior extension staff, the following steps have been taken or proposed:

(1) An intensive effort will be made to improve the competence of instructors through training courses at the four extension education institutes, colleges of agriculture and veterinary science. Till 1965 only 555 instructors had undergone extension training.

(2) Arrangements will be continued for training extension officers in the field of agriculture and animal husbandry. Under this programme so far 6,200 extension officers have received training in subject matter and 480 in extension methods.

(3) Organisation of specialised short training courses for district, regional and state level officers either in their subject matter or in extension methods. A Central Staff College will be set up for the purpose.

INTEGRATING EDUCATION AND RESEARCH

Two other problems concerning higher education in agriculture need mention here; the problem of integrating education and research and the role to be assigned to agricultural universities.

Research and education in the States are both under the control of the Directors of Agriculture. When agricultural colleges were established, state level research specialists served as

principals and as professors in various subjects in the colleges and there was an integration of education and research as a result. The research staff while serving as teachers were able to keep themselves abreast of the latest progress in their fields of specialisation. But with the increase in the number of colleges and students since Independence full-time principals and professors have been appointed in the colleges. This arrangement is conducive to under-graduate teaching but has led to a divorce of research from teaching. It is obvious that effective teaching in applied fields can be accomplished only through a continuous revision of the contents of courses in the light of the latest research and improving teaching techniques.

The First Indo-American Team recommended that the responsibility for research and education at the state level should be assigned to a Joint Director who may be the principal of the premier agricultural college of the state and that state specialists should act as the heads of departments for both research and education in their special subjects. Such an arrangement would ensure competent technical advice to the Director of Agriculture and avoid separate lines of responsibility for teaching and research which obtains at present in a number of states.

Madras was the first to adopt this recommendation and many others have adopted it in modified forms. In the states where Agricultural Universities have been established research, teaching, and extension education are being integrated in the University. The Punjab Agricultural University is pioneering in this respect. The University professor heading a particular department is not only responsible for teaching in the subject at all the campuses of the University, but also for field research in all research stations and for extension education in his field. Subject matter specialists of the university are placed with the District Agricultural Officers for extension education work in the districts and ultimately they will be attached to the blocks.

THE ROLE OF AGRICULTURAL UNIVERSITIES

The concept of the Agricultural University has developed

out of the need for establishing closer inter-relationship between research, teaching and extension programmes. In the past the traditional universities handled the training of agricultural graduates through their affiliated colleges. State Departments of agriculture were responsible for research and community development departments for extension. Liaison between these agencies was never close. Agricultural education or training programmes conducted in the colleges of agriculture are not linked with the research that is being carried on in experiment stations or with the extension organisation. The Ford Foundation, the Indo-American Teams and the Nalagarh Committee have all commented adversely on indifferent field performance of graduates trained under such a set-up. They were of the view that the programmes of education, research and extension needed to be overhauled and reoriented to meet the requirements of the cultivators. The agricultural university is conceived as a means of solving these problems.

The functions of Agricultural Universities are visualised as follows:

- (1) The University should be responsible for Statewide agricultural research, teaching and extension education.
- (2) The University should have control over all research and extension education programmes in agriculture. It should integrate these with teaching.
- (3) The University should include colleges of agriculture, veterinary science and animal husbandry, home science, agricultural engineering and a school of basic sciences and humanities preferably on a single campus.
- (4) The University should devote itself to the education problems of the rural people, to the development of leadership among them and the improvement of their standard of living.

The first agricultural university in the country was set up during the Second Plan at Pant Nagar in U.P. New universities have been set up under the Third Plan in Punjab, Rajasthan, Madhya Pradesh, Andhra Pradesh, Orissa and Mysore. Kalyani

University in West Bengal was recognised in 1965 as an agricultural university.

A token provision of Rs. 2 crores was made in the Third Plan for the development of agricultural universities. The total requirements of eight universities if they are to grow to full stature, able to undertake research, teaching and extension education in the respective states have been estimated at Rs. 98 crores. Assistance on the pattern of grants made by the University Grants Commission will be offered to these universities for development by the Ministry of Food and Agriculture through the Indian Council of Agricultural Research. It has been proposed to earmark a sum of Rs. 23.76 crores for this purpose during the Fourth Plan. New agricultural universities are expected to be established in the States of Maharashtra, Kerala, Assam and Bihar during the Fourth Plan. Ultimately every State will have its own agricultural university as recommended by the Education Commission.

Agricultural universities are concentrating their attention initially on research in agriculture, veterinary science and animal husbandry. Later they will also undertake research in some of the basic sciences, agricultural economics and rural sociology.

At present the responsibilities of Agricultural Universities for extension education vary to some extent in the different States. The Universities will be ultimately responsible for all extension education and training, including refresher courses for extension workers and farmers at different levels. But at present the role of the Universities is rather limited. In some universities short courses are provided for groups of farmers and youth both at the University or at research farms. Demonstrations are arranged both on university farms and in individual farmer's fields. University students are involved in extension work in villages as a part of their training. Agricultural Universities are beginning to play a key role in developing the information upon which effective extension education is based and in educating and training the personnel who are to develop and disseminate the information.

FINANCING AGRICULTURAL EDUCATION

Adequate financial support is proposed to be provided in the Central current plan for agricultural education. As against Rs. 1.17 crores spent during Third Plan, a provision of Rs. 32.60 crores has been made during Fourth Plan for higher agricultural education to be channelised through ICAR. Out of this Rs. 23.76 crores are earmarked for development of agricultural universities, 5.50 crores for improvement of facilities in agricultural colleges, 60 lakhs for veterinary colleges, 65 lakhs for award of undergraduate scholarship and 40 lakhs for training of teachers. In addition, the Ministry of Food and Agriculture has provided Rs. 13 crores for strengthening the training of extension workers and farmers making a total of Rs. 45 crores.

SUMMARY

There is no coherent pattern of education for agriculture at different levels. The current views indicate that instead teaching agriculture as a separate subject at the school stage, most of the subjects taught should have an ecological orientation towards agriculture. Sound general education with due emphasis on science is a prerequisite to the study of agricultural science. Post-high school education only should provide for vocational training in different fields of agriculture in agricultural polytechnics or for higher education in agricultural colleges.

The quantitative expansion of college education in agriculture that has occurred to meet the shortage of personnel for Five Year Plans, has lowered the quality of training. Regular joint quinquennial inspection of colleges by ICAR and UGC has been proposed as a remedy. Future Central assistance would be channelised towards qualitative improvement of training. Better calibre of students are to be attracted towards agriculture studies by liberal scholarships and fellowships. The facilities for post-graduate education for the present are adequate. A few selected departments in colleges and universities would be developed

as centres of advanced studies for study up to the doctorate level, to reduce dependence on foreign training for such studies.

The agricultural extension service has emerged as an agency for promoting and administering development projects. But it has failed to serve farmers as an agency for adult education to disseminate widely the rapidly changing technology in agriculture. There is need to separate the extension service from its supply and regulatory functions and link it with an extension education agency like the agricultural university.

During Fourth Plan, State Governments with the assistance of Central Government are arranging a number of short training courses for farmers and farm women at different institutions and at camps by peripatetic training teams. About 10 per cent of 60 million farming families will be covered by such training.

Training of extension workers at all levels is being intensified by organising in-service training and offering facilities for higher studies. A central Staff College is proposed to be established for the top echelons of agricultural officers of the States.

In pursuance of recommendations of several expert Committees to overhaul and reorient the programmes of teaching, research and extension to meet the needs of the cultivator adequately, the establishment of one agricultural university in each State is envisaged. It would be responsible for statewide agricultural research, teaching and extension education functions. Eight such universities have been set up so far.

Adequate financial provision has been made for higher agricultural education and for the training of farmers and extension workers during the Fourth Plan. The total outlay of over Rs. 45 crores has been earmarked for the purpose.

PRICE POLICY AND FARM INCOMES

M. L. DANTWALA

The critical role of agriculture in economic development is now well recognised. In most of the predominantly agricultural countries, agricultural economy is backward; productivity is low and growth rates are sluggish. The fast rate of growth of population increases the pressure of population on land; thus, in spite of the rising prices of agricultural commodities, incomes of a large section of the agricultural population remain more or less at subsistence level. The faulty land tenure system aggravates the problem for a section of farm population. Since a large majority of the population derives its livelihood from agriculture, low farm incomes present a formidable welfare problem.

Farm incomes are generally much lower than incomes in other sectors of the economy. Even the remarkable advance in farm technology in the developed countries has not been able to correct this imbalance. For example, in 1960, in the U.S.A. farm population which constituted 8.7 per cent of the total, could generate less than 2 per cent of the gross national product.

In India, the net output per worker in the agricultural and the non-agricultural sector respectively in 1960-61 was Rs. 437 and Rs. 1,297 at 1948-49 prices. But it is the dynamic aspect which is more disturbing. Ignoring the relative changes in the prices, between 1951 and 1961, the ratio of incomes per worker in agricultural and non-agricultural sectors deteriorated from 0.37:1 to 0.34 : 1. At current prices, the ratio deteriorated from 0.41:1 to 0.37 : 1. It may, however, be noted that the change in the population census definition of "agricultural worker" exaggerates the increase in the number of agricultural workers between 1951 and 1961 and consequently depresses their per capita income in 1961.

The deterioration in the ratio of agricultural and non-agricultural income takes place not only because the rate of growth of production in real terms in the agricultural sector is less than that in the non-agricultural sector,¹ but also due to the fact that this relative sluggishness is not compensated by a corresponding transfer of labour force from agriculture to other sectors of the economy. Under the circumstances, only a highly favourable turn in the terms of trade for agriculture would check the decline in the income ratio.

During the last few years, there has been an increasing appreciation in India of the need to provide remunerative prices for agricultural commodities for stimulating agricultural production. Last year, the Government of India constituted an Agricultural Prices Commission to advise on the price policy for agricultural commodities. The Commission, *inter alia*, was asked to keep in view "the need to provide incentive to the producer for adopting improved technology and for maximising production".

The Government have by now announced minimum support prices for paddy, wheat, gram, some coarse grains, cotton and jute. In addition, in the case of commodities like rice and wheat, which are acquired by the Government for maintaining a system of public distribution, procurement¹ purchase prices are announced, and these are higher than the support prices. The minimum support prices are viewed as providing a relatively long-term guarantee to the farmer to the effect that prices will not be allowed to fall below the stipulated levels, and for this purpose, the Government stands committed to buy as much quantity of the commodity concerned as may be offered for sale. On the other hand, the quantum of purchases made at the procurement prices depends upon the requirements of the Government. In some States, off and on, maximum prices were also declared to prevent excessive rise in prices in the interest of restraining the rise in the cost of living and cost of production for export commodities. But this measure was not generally supported by the Agricultural

¹ Between 1950-51 and 1964-65 the compound rate of growth of income per year (at constant prices) in agricultural and the non-agricultural was 2.6 and 4.5 per cent respectively.

Prices Commission because it was felt that in the absence of buffer stocks with the Government, it was well nigh impossible to implement the policy.

Farm incomes depend upon production as well as prices. Agricultural production, especially when it is predominantly dependent on capricious rainfall, fluctuates a great deal from season to season. Normally, the market mechanism provides the compensating factor; prices rise during a short crop and fall when the crop is abundant. But the (long-term) average level of prices is also a function of demand, and there can be no assurance that this level of prices will yield a reasonable, or even subsistence income to all farmers and the farm community in general.

Strictly speaking (net) farm income depends upon productivity rather than on production of the farm. For a majority of farmers in India, the cost of cultivation (per unit of production) is very high and even reasonable prices hardly yield a decent income above the subsistence level. This is a consequence of the low productivity of inputs. And when this happens in conjunction with the small-scale of the enterprise (holding), it is not surprising that the net income of a large number of farmers is very small. Consequently, therefore, farm incomes can rise if (a) farm prices rise, and/or (b) farm productivity improves, and/or (c) (in the case of individual farmers) the scale of operations become bigger. The last factor is very crucial, but in the short run, nothing much can be done about it. The preponderance of small and uneconomic holdings is a consequence of the pressure of population and the absence of well-developed and diversified economy. As such, the malady can be cured only when the root cause—lack of dynamic economic development—is removed. This does not preclude adoption of relief or rehabilitation measures during the transitional period. But any attempt to make a basically uneconomic unit of enterprises remunerative by high product prices would be self-defeating.

The major function of the price policy is to correct the malfunctioning of the market mechanism. A specific instance of such malfunctioning would be a lack of buying competition in remote interior markets. Farmers in such an area should be assured

of reasonable prices preferably through the operation of a co-operative marketing society, working in collaboration with an agency like the Food Corporation of India. A more complex situation which may be only hypothetical is one under which adoption of improved farm technology is inhibited by the existence of an unpromising ratio of input-output prices. Fertilisers may be too costly in relation to product prices. Here too, the first concern should be to critically examine the technical aspect of the problem. For example, the response of many indigenous varieties of seed to increased application (beyond a point) of fertilisers was found to be rather poor. The response improved considerably when imported varieties of seed were introduced. Thus, the fault lay with technical co-efficients rather than with fertiliser-product price ratio. Here too, the merits of alternative policy measures, one of subsidising inputs and the other of increasing production prices should be fully investigated. In brief, it needs to be emphasised that higher prices—because they appear to be the least inconvenient device—should not be accepted as a remedy for all manner of economic maladies. An obvious case is that of a crop failure. A short crop will automatically result in higher prices, but it cannot be taken for granted that they will necessarily succeed in maintaining normal farm incomes. Crop insurance is a proper remedy for situations like these. In case such a scheme is not in operation, some *ad hoc* relief measures will have to be adopted to mitigate the distress of the farm population.

There is a further problem of unstable incomes—as distinct from that of low incomes. Such instability has deleterious effect on investment and enterprise. Unstable incomes are a consequence of (a) unstable production and (b) unstable or fluctuating prices. Remedies against uncertain production and uncertain prices are different. Assured water supply and prompt action against pests and diseases would help stabilise production. Greater stability to prices can be imparted through the facility of an efficient forward market and schemes of buffer stock operations. At international levels, Commodity Agreements, etc., have been tried, but not with much success.

There are situations under which higher product prices may not serve the purpose for which they are offered. Agricultural production depends ultimately on the quality and quantity of inputs. If the supply of some of the critical inputs is inelastic or suffers from unavoidable constraints—such as paucity of foreign exchange—higher product prices will result only in higher factor (input) prices. Further, since farmer's decisions are governed by the relative prices of substitutable crops, price incentive is more effective when a shift in production—say from industrial raw materials to food crops—is desired. If, as in the case of India, a simultaneous increase in the production of practically all crops—rice, wheat, cotton, jute, oilseeds—is necessary, the impact of a blanket increase in product price would be mainly on the farmer's incentive to put in more effort and on the stimulus it would provide to increased production with better quality of inputs. This is not a small gain, but the efficacy of the price incentive will be limited by factors such as physical constraints on inputs, production and the psychology of the farmers.

Prices and the incomes which they provide to the producers are meaningful, only in terms of their purchasing power. Higher incomes if they are quickly reflected in higher costs—of production and family budgets—would only generate a spiral of cost-price inflation, which will erode the real value of higher incomes. A deliberate attempt to push up incomes through higher prices of the products in one sector will only lead to a general price inflation.

Products of the agricultural sector has a "weight" of 62 percent in the general wholesale price index. This means that a 50 per cent increase in the prices of these products will generate a rise of 31 per cent in the general price level. Food articles have also a substantial "weight" in the Consumers' Cost of Living Index. The recurrent demands for enhanced dearness allowance, consequent upon an increase in the cost of living, clearly demonstrates the money illusion of higher prices, wages and incomes.

Earlier, a reference was made to the share of agricultural income in the total of national income. In 1951, the value of

the output in agriculture was Rs. 48.9 abja which constituted 51.3 per cent of the total net national output. In 1961, the value of agricultural product increased to Rs. 68.9 abja—as current prices—but its share in NNP declined to 48.7 per cent. The latest available estimates are for 1963-64. In that year, the value of agricultural output was Rs. 78.3 abja and its share in national income 47.1 per cent. In the relative changes in the prices of the products in the agricultural and the non-agricultural sectors is ignored, *i.e.*, production is valued at constant prices, the percentage shares of agricultural incomes in the total national income in the same three years—1951, 1960-61 and 1963-64—would be respectively 49.0, 46.4 and 42.4. The latter figures indicate that the growth-rate in the agricultural sector has been slower than that in the rest of the economy. The percentage at current prices taken in conjunction with those at constant prices, reveal that the terms of trade, on the whole, have been slightly favourable to agriculture. This trend has been strengthened during the last two years.

Index Number of Wholesale Prices

Base 1952-53=100

(April-March)

Year	Foodgrain	Commercial Crops*	Industrial raw materials	Manufactures
1954	80.0	106.1	104.0	100.4
1955	69.7	93.1	97.3	99.4
1956	89.8	108.1	113.2	104.9
1957	98.6	113.5	118.1	108.0
1958	102.8	113.5	114.7	108.2
1959	103.5	122.1	119.7	109.7
1960	103.0	140.3	138.8	120.8
1961	99.7	144.2	147.7	127.2
1962	105.3	134.0	137.3	128.1
1963	111.1	145.6	137.3	130.3
1964	137.5	161.1	156.4	134.9
1965	148.8	174.7	180.7	45.7

*Cotton (raw), jute (raw), groundnut, sugar and gur.

The aggregate quantum of agricultural incomes, however, does not provide an adequate indication of individual incomes. As already pointed out, the latter would depend on the size of population in different sectors of the economy. Only the decennial population census provides the data of occupational distribution. Between 1951 and 1961, there was practically no change in the percentage of population deriving livelihood from the agricultural and non-agricultural sectors.

Individual incomes in the agricultural sector would be affected also by the relative shares of the occupational groups—non-cultivating owners, cultivating owners, tenants and agricultural labourers—within the sector. Land tenure reforms undertaken in the country has presumably improved the relative positions of owner-cultivators and tenants. It is difficult to be precise about the relative position of landless labourers. Agricultural wages have gone up, but the extent of increase varies so much from region to region and from season to season—and even in-between the seasons—that it is difficult to say with confidence whether the increase in money wages has been adequate to compensate for the increase in the cost of living. Labour income in agriculture in real terms is further dependent on the portion of wages received in kind. The period of employment is equally crucial and though employment opportunities have increased because of the extension in cultivation and irrigation facilities, the labour force also has increased considerably.

Economic analysts and policy-makers have not been able to make up their mind as to whether the agricultural prices during the last few years—and even currently are high or low. The policy-makers, in particular, seem to be speaking with two (divergent) voices. In the discussion on the general economic situation, they emphasise the importance of holding the price line. This realisation becomes painfully acute when the successive jumps in the cost of living index compel a recurring step-up in the dearness allowance to Government employees or when our export goods are decisively priced out of international markets due to rising costs of raw materials and wages. But, very often, the same policy-maker, time and again, pleads for higher and higher prices

for agricultural commodities under the belief that high prices will stimulate higher production and where foodgrains are concerned, facilitate higher procurement. Foreign experts too, drawing largely from the experience of advanced economies, have often buttressed this belief. Certain broad facts about the relative prices are given in the above table. They support the statement made earlier that the commodity terms of trade have been, by and large, favourable to agriculture, even from 1951 to 1963—except for two years, 1954-55 and 1955-56, when they were severely adverse to agriculture. Prices, however, do not wholly determine profitability which depends on the input-output ratios: on production costs and sale receipts. Adequate and dependable information on this aspect on the agricultural economy is not available. The information on the ratio of prices paid and is not available. The information on ratio of prices paid and prices received is scanty and not scientifically derived. But even this will not indicate the cost price relation, because such analysis would need, in addition, information on changes in the technical co-efficients. Even if the ratio of prices received to prices paid becomes unfavourable to the farmers, his income may not be affected if inputs now yields a larger output in physical terms.

It would thus appear that farm income can be sustained and augmented primarily through increase in agricultural productivity. Price policy should be oriented to facilitate such endeavour by progressive farmers. Low incomes in agriculture are basically a consequence of pressure of population on land resulting in small uneconomic holdings. High agricultural prices cannot compensate for low productivity and meagre farm assets—land and capital. The remedy for low income resulting from the above lies ultimately on technological improvements within agriculture and development and diversification of the entire economy which would reduce the pressure of population on land—which at present is the last refuge of the unemployed.

PROBLEMS OF AGRICULTURAL CREDIT

S. K. DATTA

One of the problems of agricultural credit in India is the lack of credit-worthiness of the bulk of the cultivators looked at from the point of view of the provider of credit—be it an institutional agency or a private money-lender. The farmer's only asset is land.

Another important factor enhancing the risks of agricultural credit is the nature of Indian agriculture which is dependent on the uncertain monsoons. The massive programme of irrigation taken up since Independence has not yet been able to assure water supply to more than one-fifth of the total cultivated area. Along with the vagaries of nature, there have been wide fluctuations of prices from season to season adversely affecting the repayment capacity and thereby the credit worthiness of the cultivators.

Yet another factor is the farmer's attitude and psychology which must change. The farmer must appreciate that agriculture is not merely for providing sustenance but it can be a profitable venture if his borrowings are production-oriented, resulting in higher income and not weighted towards consumption needs.

In sum, the problem of agricultural credit in India is not merely one of providing funds necessary for the purpose and setting up the institutions to disburse them, although these are basic. It is part of a larger problem of the economic rehabilitation and reconstruction of agriculture in the country.

VARIETIES OF CREDIT USERS AND CREDIT NEEDS

Cultivators may be classified into different categories according to the nature of crops grown which govern their needs of credit

from the point of view of the quantum as well as the period for which credit is needed. The purposes also would vary in detail for different crops. For instance, the credit needs of cultivators of plantation crops and orchards are very high. Heavy initial investment as well as a period of waiting are involved. For other commercialised but seasonal crops like jute, sugarcane, cotton and oilseeds, the initial investment as well as the period of waiting are less and the needs of those cultivators are not markedly different from growers of foodgrains.

Credit is required by the farmer for the purposes of production, marketing and any processing that may be needed before marketing as well as for essential consumption needs. Credit is classified as short term, medium or long term from the point of view of period of repayment; one year to eighteen months for short term, 3-5 years for medium term, and 5-15 years for long term. Short term credit is needed for current or seasonal requirements, which can be paid back, once a successful crop is raised and marketed. The cash expenditure, traditionally incurred by cultivators for which short term credit is needed, are as follows:

Cash wages for labour engaged casually or on an annual basis, seeds, manures, purchase of fodder and miscellaneous other materials, maintenance and repair of implements, hire of bullocks, etc., payment of land revenue or irrigation charges, cash rents and interest.

For improved agriculture the cost of improved seeds, chemical fertilizers, pesticides, fuel or electricity for mechanised equipment, its repair charges, etc., should be added.

The true categorisation of medium term credit would be for replacement of or minor additions to capital equipment, e.g., bullocks, relatively inexpensive implements and machinery and spare parts, etc. Items of investment proper, as in reclamation, or improvement of land, sinking of wells, purchase of tractors and other machinery, pumpsets, etc., should be financed by long term credit. In actual practice, however, medium and long term credit overlap. Loans for items of investment involving comparatively less expenditure, which may be repaid within three to five years, can be advanced out of medium term loans. Due to the

inadequacies of the credit structure, often loans for investment purposes which should be of a long term nature and repayable over a period of years, are advanced as medium term loans resulting in the cultivators defaulting in the repayment of the heavy instalments prescribed.

Credit for marketing is usually of a short term nature and once the sale proceeds of the crops are received, the advance may be paid back; similarly for processing also, except for the purchase of processing equipment which has to be financed through medium or long term loans. The credit for consumption can be of short or long term nature according to the purpose for which the loan is taken and the size of the loan. Loans for meeting day-to-day cash expenditure while the crops are in the field can be financed by short term loans, but loans for purchase of land, construction or repair of houses, repayment of old debt, expenditure on marriages and funeral ceremonies, litigation, etc., would involve the cultivator in long term debt.

The need for credit varies as between different classes of cultivators. The well-to-do farmer can meet his short term need and possibly a good portion of medium or long term needs from his own resources whereas the less well placed cultivator would certainly need credit for his entire long term investment and possibly a good portion of short term needs also. The real problem is constituted by the marginal and sub-marginal cultivators who constitute the largest number and are caught in a vicious circle. Even when he is convinced of the need for larger investment, he cannot raise credit. Without the investment his income and assets cannot rise and he cannot become credit-worthy.

While the short term loans are often on personal security, medium and long-term loans, are usually secured by a mortgage on the land of the cultivator. But short term loans advanced by the private money-lenders, who constitute the largest source of credit to cultivating households, may be secured by a mortgage of the land unless there is gold or silver to pledge and a great deal of alienation of agricultural land takes place because of the cultivator's inability to repay the loan which from short term

become very long term indeed.

In the interest of a healthy credit structure and for that matter, healthy agriculture in India, it is very necessary that there should be a scientific price support policy for all agricultural crops, particularly the major foodgrains and crops on which our industry and export earnings depend. Remunerative prices should be fixed preferably for two or three seasons in advance and declared sufficiently before the harvest, so that the growers are in no uncertainty and would not part with their grains at low prices to traders and middlemen. It obviously follows, that there should be a marketing or procurement organisation throughout the country, to implement the price support policy. To safeguard the farmer against the vagaries of nature or destruction by pests and diseases, it is also necessary to introduce a national scheme of crop insurance. In periods of drought or floods or widespread destruction of crops by pests and diseases the cultivators invariably default in repaying loans which renders them ineligible for fresh credit and clogs the entire system. In addition to price support and crop insurance, it is necessary to build into the credit structure itself a stabilization fund to convert short term loans into medium term and avoid the cultivator being declared a defaulter. A beginning has been made in the National Agricultural Credit (Stabilization) Fund created by the Reserve Bank of India, but the cooperative institutions advancing short and medium term loans, or the State Governments, have not yet put enough resources in the Stabilization Fund to make it really effective.

Credit may be advanced wholly in cash, wholly in kind or partly in cash and partly in kind. Due to scarcity in supply and undeveloped nature of sales organisations in the country, it becomes imperative to provide credit in kind for items which the cultivator cannot obtain for cash because of short supply. Fertilisers, pesticides, pest control equipment, and small implements not widely marketed by commercial organisations, fall into this category. Credit in kind has the advantage also of preventing the diversion of money advanced as credit to purposes other than intended, mainly for consumption. The difficulty,

however, is often administrative, where the supply organization including storage, etc., has not been built up by Government or cooperative institutions or adequate finance is not provided for purchases and stocking. As a matter of fact, in the "crop loan" system, which it is intended to make universal, there are three components. The first component comprising of the requirements of traditional agricultural practices, is to be advanced in cash. The second component, comprising of modern and improved inputs like improved seeds of high-yielding varieties, chemical fertilisers, and pesticides, is to be advanced in kind. The third component is again, a cash element estimated to be the additional requirement for putting into the field the improved or higher inputs.

Agricultural credit must be seasonal in nature related to the particular crop for which credit is needed. The credit must be made available in time to meet the cash requirements of the cultivator for wages, purchase of seeds, the application of fertilisers and pesticides, etc., according to the requirements of the particular crop. Even long term credit for land improvement, sinking of wells, etc., has an element of seasonality, as certain types of capital works can be carried on only during the dry months.

AGENCIES PROVIDING CREDIT AT PRESENT

The agencies providing credit to cultivators, as revealed during the Rural Credit Survey of 1951-52 and the All India Debt and Investment Survey 1961-62, are listed in Table 1 (p. 342) :

It is clear from Table 1 that the private money-lenders of different types have been the most important agency providing the largest amount of credit to cultivators for purposes of production or otherwise. The traders and commission agents as well as the commercial banks provide finance largely for marketing. Government has been a source of credit for a long time: it grants loans under the Land Improvement Loans Act 1883 for long term purposes like effecting improvements in land and loans to meet the current needs of the farmer under the Agricultural Loans Act of 1884. These loans popularly known as Taccavi have been traditionally made to relieve the farmer of the

TABLE 1

Credit Agency	Proportion of borrowings from each agency to the total borrowing of cultivators*	
	1951-52	1961-62
Government	3.3	2.6
Cooperatives	3.1	15.5
Relatives	14.2	8.8
Landlords	1.5	0.6
Agriculturist Money-lenders	24.0	36.0
Professional Money-lenders	44.8	18.2
Traders & Commission Agents	5.5	8.8
Commercial Banks	0.9	0.6
Others	1.8	13.9

immediate distress caused by natural calamities like floods and drought. In recent years, however, apart from advancing loans in time of distress, increased emphasis has been laid by Government on development and production. The loans are advanced now for the purchase of tractors and machinery, pump sets, digging of wells and tanks, soil conservation and development of land as well as for the purchase of seeds, fertilisers and pesticides.

Cooperative institutions are the largest source of agricultural credit and have made remarkable strides in the period between 1950-51 and the present day. Cooperative Central Banks and Primary Credit Societies provide credit for short and medium term and the Cooperative Land Mortgage Banks for long term. The Table 2 shows the growth of co-operatives in India since 1950-51:

Among other State institutions playing a significant role in agricultural credit, is the Reserve Bank of India, which maintains an Agricultural Credit Department. The financial accommodation

*Percentage relates to total borrowings in 1950-51 and cash borrowings in 1961-62.

provided by the Bank to various State Cooperative Banks has increased from Rs. 1.50 crore in the year 1946-47 to Rs. 254

TABLE 2

	1950-51	1963-64
1. Number of Primary Credit Societies (lakhs)	1.05	2.11
2. Membership (lakhs)	44.08	241.08
3. Loans advanced (Rs. crores)	22.90	295.20
4. Working capital (Rs. crores)	37.25	442.29

crores in 1964-65, for short term loans and Rs. 7.91 crores for medium term loans. The Bank, however, does not finance agriculturists directly. It makes available the accommodation to the State or Apex Cooperative Banks, which pass on the credit to the cultivator through Cooperative Central Banks and the Primary Credit Societies in the State. Apart from providing medium term loans to the cooperative banks, the Reserve Bank has also been subscribing to the debentures floated by the Mortgage Banks and making long term loans to State Governments for subscription to the share capital of the cooperative institutions. The Reserve Bank has created two Funds, namely, the National Agricultural Credit (Long term operations) Fund and the National Agricultural Credit (Stabilisation) Fund. While the long term operations Fund is utilised for making loans and advances to State Governments and cooperative institutions for various purposes, the Stabilisation Fund provides the State Cooperative Banks extension of time required to repay their dues on account of short term loans because of the cultivator's inability to pay due to widespread drought, floods or other natural calamities causing loss of crops.

The other state institutions involved in providing agricultural credit are the State Bank of India and the Life Insurance

Corporation of India. The State Bank of India, apart from providing short term accommodation to various cooperative institutions also contributes to the purchase of debentures floated by the Land Mortgage Banks. It finances cooperative processing units as well. The Life Insurance Corporation of India also purchases debentures of Land Mortgage Banks. Another institution recently set up, is the Agricultural Refinance Corporation, which refinances long term loans granted by the Land Mortgage or Scheduled Banks on approved schemes of land development, plantations, irrigation works, etc., by purchasing debentures of these banks. The Food Corporation of India has also been authorised to provide credit to producers against crops offered to be purchased by the Corporation after harvesting.

Commercial banks, which in western countries play a significant role in providing agricultural finance, have not been important from the point of view of credit for agricultural production as such. The commercial banking structure in India has grown in cities and towns in response to the needs of trade and industry. The rural interests, including agriculture, have, by and large, remained outside their scope. It cannot be expected that with their present capital structure, lending policies and organisation, these banks can enter into the field of providing credit for agriculture in any significant measure. Of course, with the opening of rural branches, particularly, by the State Bank of India, some richer cultivators would undoubtedly open accounts in banks and can get accommodation on their personal security or by pledging crops. By and large, the smaller cultivators will remain outside the fold. These banks are also not likely to engage in medium or long term lending under present conditions. A suggestion has been made that separate agricultural banking institutions may be established, which would act as a buffer and would be able to refinance commercial banks enabling them to advance credit for agriculture, short, medium or long term, as the case may be. This suggestion deserves to be pursued.

The Indian manufacturers and dealers cannot extend credit and-hire purchase facilities as is being done in advanced countries unless there are financing organisations behind them. With

increased mechanisation and growing demand for machinery, etc., it will be necessary to develop these facilities which will relieve the pressure on cooperative institutions and government and also obviate the need for mortgaging the land for every medium or long term loan, whatever the purpose may be.

DEFECTS OF EXISTING ARRANGEMENTS

The main defect of the existing arrangements for institutional credit is inadequacy, which is two-fold. First of all, the coverage is too small. Only 39 per cent of the cultivating households are members of cooperative societies which are the biggest providers of credit. Again cooperative credit is effectively utilised by a small fraction of cultivators. Even that is monopolised by the relatively well-to-do farmers in most states, leaving the genuine credit needs of the vast majority unfulfilled. The second aspect is the inadequacy of institutional finance as compared to the needs. This is reflected in the percentage of loans from cooperatives and government to the total borrowings, as given in Table 1. Not all the loans advanced by cooperatives and state governments are utilised for the productive purposes. Sample studies made by the Programme Evaluation Organization of the Planning Commission reveal that on an average more than 41 per cent of the borrowers from cooperative societies admitted diverting their short and medium term loans. The magnitude of diversion varied from 7 per cent to 89 per cent as between states where cooperatives are well developed and where they are not. The picture cannot be very different for state taccavi except for items supplied in kind. No wonder, that no real correlation can be established between amounts disbursed as loans for production and the increase in production.

Another bane of the existing arrangements is lack of timeliness. As noted earlier the need of credit for agriculture is strictly seasonal but often neither cooperative nor government loans are available in time. The result is, that either the needed inputs cannot be applied or the farmers have to depend on money-lenders. Another defect is inadequate arrangements for recovery

of loans. The overdues of cooperative societies range from 10 per cent in Madras to 76 per cent in Assam. The non-repayment and overdues of government taccavi must be worse, as on top of factors like natural calamities making realisation of loans difficult, there is the reluctance of democratically elected state governments to make determined efforts to recover taccavi loans.

In India, the cooperatives have been a government sponsored movement with the usual official approach and without the preparation of the ground or imparting the pre-education that is necessary. By and large, cooperatives have been looked upon as an agency from where money can be got easily which need not be repaid except under duress just as taccavi loans. The value of cooperatives in improving the economic condition by joint effort, treating every member as equal with complete democratic control over management, the full appreciation of the need for thrift and investment of surplus over expenditure in one's own cooperative with self-reliance as motto, has not taken root. The right leadership has also not developed in the field of cooperatives. These factors probably explain why the growth of cooperatives has been so uneven in the country.

The other most important source of credit is government taccavi, the origin of which is in relieving distress. Today it has an added significance as most of the loans are for productive purposes, short or medium and long term. But government is not an ideal banker for giving credit.

The fact that credit for agricultural production must be seasonal and timely is hardly realised. State governments have not even bothered to coordinate their loaning activities at any level. Revenue, Agriculture, Community Development Blocks, industries—all are advancing loans for agriculture with no expert staff to assess the needs and the repayment capacity, to supervise utilisation and repayment. Of course, government loans advanced in kind in the shape of seeds, chemicals, fertilizers, pesticides and implements have been wholly beneficial and have prevented misutilisation or diversion. But recovery is another question. Agencies other than Revenue Department take little interest and the Collector is too busy to give any real attention to it.

CREDIT IN THE CONTEXT OF INCREASING AGRICULTURAL PRODUCTION AND CRITERIA OF A SOUND SYSTEM

If India is to make a break through in agricultural production resulting in self-sufficiency in foodgrains and fibres and other crops, agriculture has to be revolutionised by adopting scientifically and technically approved practices, and making much heavier investments—long, medium and short term. The cultivators will need vast quantities of high-yielding seeds, fertilizers and pesticides, as well as implements and machinery. In addition, a great deal of minor irrigation, land improvement, soil conservation and work on the land necessary to attain maximum utilisation of available water resources will be necessary. Investment in these cannot take place without a sound system of agricultural credit when the vast majority of cultivators have no savings for investment purposes. The credit system must ensure adequacy of finances for short, medium or long term in the correct proportion for purposes of production, marketing or processing as well as something for consumption purposes, so that the farmer does not divert credit to unproductive purposes, or is not driven to the money-lender. The system should reach the farmer at his door and render service. It should not consist merely in disbursement and recovery of loans, but also should aim at the proper utilisation of the loans, and at the same time, enable the farmer to develop such habits, measures and practices which in the long run, help him to achieve the ultimate goal of increasing his income.

A sound system of agricultural credit which ensures the use of the credit to production use requires an adequate extension service, adequate arrangements for the supply of inputs and other essential services, remunerative prices and proper link between credit and marketing, a land tenure system that assures security and economic rents and an infrastructure of good roads, storage facilities, supply of power, etc., and educational and health services in rural areas. Credit institutions at the village and block levels should link their loans to agriculturists with the supply of

inputs and with the marketing of produce. There should be a "package of services" approach.

A SCHEME OF CREDIT

We may here consider the measures necessary to plan agricultural credit on a sound basis.

Assessment of Credit Needs

The first step is to assess the credit needs for agriculture. Recently, a Study Group, set up by the Government of India, made an assessment of short-term credit. The Group's estimate of requirements for production purposes alone is Rs. 735 crores in 1966-67. The group omitted items of consumption and even items like land revenue, rent, irrigation rates and interest charges which enter into the cost of production. A panel of economists reviewed these estimates and suggested certain downward adjustments which, if accepted, would bring down the figures to Rs. 655 crores in 1966-67 and Rs. 155 crores in 1970-71. The panel of economists themselves made two separate estimates; one on the basis of the ratio of borrowings for current expenses to national income from agriculture. This gave a figure of Rs. 956 crores for 1966-67 and Rs. 1228 crores for 1970-71 of anticipated total borrowings for current expenditure in farm and non-farm business and household expenditure. The panel's second estimate was based on per acre borrowing for current expenses of cultivating households. Making provision for financing improved inputs like fertilizers, etc., the total anticipated borrowings for current expenditure including household expenditure came to Rs. 1048 crores for 1966-67 and Rs. 1341 crores for 1970-71. In round figures, it may be estimated that the short term borrowing needs of the cultivators including requirements for consumption expenditure, would be of the order of Rs. 900 to 1000 crores in 1966-67 and Rs. 1200 to 1300 crores in 1970-71.

The estimate of medium term credit made by the Study Group for the Fourth Five Year Plan period, was Rs. 406 crores and for long term credit the figure was Rs. 822 crores. The yard sticks

used for calculating the medium and long term credit were the Fourth Plan targets for wells, tubewells and provision of pumpsets, etc., land reclamation, and soil conservation, development of irrigated areas including digging of field channels, land levelling, etc., investment in orchards and plantation crops other than tea and coffee and the cost of purchase of livestock, tractors and other mechanical equipment. The estimate of credit is a percentage of the total cost, which the cultivator is likely to borrow; the rest being borne by the cultivator.

As against these estimates of credit requirements, the targets of the cooperative institutions, which is the largest credit agency for agriculture, is Rs. 650 crores for short and medium term loans combined for the last year of the Fourth Plan, namely, 1970-71. For 1966-67, it is Rs. 453 crores. For long term loans, the target is Rs. 300 crores for the entire Plan period.

The achievement of the cooperative institutions providing short and medium term loans by the end of 1965-66 is likely to be Rs. 380 crores as against the Third Plan target of Rs. 530 crores. It is doubtful, if the 1966-67 target of Rs. 453 crores can be reached. It should be also remembered that a good proportion of cooperative short and medium term loans has probably been used to meet consumption expenditure and not for productive investment.

The long term target of Rs. 150 crores for the Third Plan period is likely to be realised by the Cooperative Land Mortgage Banks in the country and except for the percentage of the total advanced to repay old debts, the bulk of it should have been utilised for productive purposes.

Agencies for the Provision of Credit

(i) **Cooperative Institutions:** The accepted National Policy has been to develop cooperative institutions to meet all the needs of credit of the cultivator. As things stand, the cooperatives will not be able to meet more than about 25 per cent of the total credit demand for agricultural production. In order to play their role effectively, even within this limitation, urgent reforms like the

elimination of dormant societies, amalgamation of non-viable societies into viable units etc., have to be undertaken. Hitherto, most of the cooperative loans, particularly short term, bore no relation to needs of production but were based on the assets of the borrower. The introduction of the "Crop Loan System" is a step in the right direction and should be universally adopted. Apart from the vastly increased demand for resources, which the crop loan system will give rise, there are also administrative problems. The Block Development Authorities are expected to assist individual farmers in preparing their farm plans from which the requirements of crop loans would be calculated. The primary societies have, therefore, to work in close cooperation with the Block Development Authorities to make arrangements in time for the funds necessary and their disbursement. The present procedures have been found complicated and cumbersome as well as time-consuming. The cooperative system, right from the Reserve Bank downward, should become more flexible without detriment to sound banking principles.

The next difficult problem is the supervision over utilisation and realisation of loans due, so that overdues do not accrue. The managing committees of cooperative societies as well as the Panchayati Raj organisations can play a very useful role in this respect. The block development staff and the government cooperative staff should work in close cooperation. As already mentioned one of the ways of meeting the problem of overdues effectively is to organise cooperative marketing in an effective manner in every rural marketing centre which could help the credit societies by collecting their dues when the cultivators' produce is brought to the marketing societies for sale.

The cooperative credit structure in India is based on a three tier system, namely, the apex State Cooperative Bank, the District Central Banks and the Primary Societies. The rate of interest gets added to at every stage to meet the administrative and other expenditure of the different organisations and is very much higher at the receiving end of the cultivator than the concessional rates at which the Reserve Bank makes funds available. While it is not intended to interfere with the three tier structure

where it is functioning effectively, there does not seem to be any justification to impose it uniformly in all areas where conditions may be different.

In some areas the development of cooperative societies has been hampered by the issue of government taccavi at a lower rate of interest than the cooperative loans. Where resources are so short and a large percentage of cultivators does not benefit either from the cooperatives or from taccavi, there is no point in permitting competition between the two systems. The Central Government has always recommended to the states to channel all taccavi through the cooperative system which only some states have accepted. This again should not be enforced rigidly without a thorough scrutiny of the strength of the cooperative structure in the areas to satisfy oneself that the cooperatives are in a position to meet the credit needs of all farmers. It should be realised that co-operative loans and taccavi are not competitive but complementary. The strength of a successful cooperative credit system lies in its own resources, namely, the share capital and deposits of members at the primary level; and deposits from members of the public, various institutions and trade and industry, etc., at the central bank and the apex bank levels which carry on considerable banking operations apart from advancing loans to primary credit societies.

Under the present conditions, there are many handicaps to the cooperatives. The prosperous rural farmer has become a money-lender in his own right, replacing to a great extent the professional money-lender, and can invest his savings at a much more profitable rate by giving loans direct. He often borrows from cooperative societies up to the limit allowable due to his assets and reinvests the funds at higher rates of interest in money-lending and other business. Deposits in a cooperative society are not attractive enough from the investment point of view. There is also the active small savings campaign conducted by the State Governments which mops up a great deal of rural savings. The Life Insurance Corporation of India is also extending its business in the rural areas and savings are partly being invested in insurance policies. Lastly, the hunger of the Indian villager

for gold and silver remains, in spite of the Gold Order and the stoppage of the import of silver. It will require a great educational and missionary effort to convince the cultivator, particularly, the small man, who is not interested in investment for gain as such, to put in whatever surplus or savings he has, in his cooperative society which would be to the interest of himself as well as the entire farming community of the locality.

(ii) **Agricultural Credit Corporations:** The Informal Group on Institutional Arrangements for agricultural credit appointed by the Reserve Bank of India in 1964, has come to the conclusion that in spite of the efforts of the Reserve Bank of India and the government, much headway has not been made in some parts of the country and the progress in the supply of agricultural credit through the cooperative agencies for meeting the current and development needs of the cultivators, has remained uneven. The Group has, therefore, recommended that as a transitional measure, an Agricultural Credit Corporation be set up in the five States of Assam, Bihar, West Bengal, Orissa, and Rajasthan, where the cooperative movement is relatively weak. These corporations should withdraw from operations as and when the cooperative movement in the states concerned gets strengthened. It is expected that these corporations will be established by legislation undertaken by the Government of India. Their capital will be subscribed, to some extent, by State Governments but in the main, by the Government of India, Reserve Bank of India and the State Bank of India. The working funds will be borrowed from the State Bank of India or the Reserve Bank or both. The Reserve Bank of India will have to undertake the promotional role. The corporations should mainly aim at providing short term loans for agricultural production on the basis of rational and production-oriented loan policies embodied in the crop loan system. Though the corporations may advance loans to substantial cultivators direct, they may find it prudent and convenient to make loans to small cultivators on a group basis, against joint bonds. The corporations will aim at the linking of credit with marketing and will advance loans to foodgrain producers on condition that the borrowers agree to repay the loan by definite

delivery of grains to the Food Corporation of India or its agents. The Corporation will accept non-refundable deposits from the individuals borrowing from it, in lieu of the share capital which they would have contributed, if they had been borrowing from a cooperative. The intention is that in due course, when the corporations would withdraw, these deposits would be transferred to cooperative societies to serve as share capital of these societies. The corporations may also accept deposits from members of the public, local bodies, quasi-government institutions, and cooperative institutions. If there are dormant cooperative societies in the villages, where the corporations will function, these will have to be liquidated.

Experience gained in the Intensive Agricultural District Programme has led to the conclusion that even in areas where the cooperatives are quite strong and active, according to the present standards, there is need for an alternative source of credit in order to support an agricultural development programme. Due to inadequacy of the financial resources and coverage of the cooperative societies, the IADP has to depend very largely on government taccavi loans for short-term as well as medium term purposes in addition to whatever the cooperatives could provide in those areas. The Agricultural Credit Corporation as recommended by the Informal Group, would advance only short-term credit. There is need, however, of medium and long term loans, if development is to proceed on the lines contemplated. Without the backing of long-term loans for investment purposes, the demand for short-term loans for production cannot be generated. Mr. Miles, Leader of the Ford Foundation Team, working on the IADP has recommended the creation of an All-India Agricultural Corporation, on a permanent basis to provide a dependable source of production credit, short, medium and long term, as the case may be, which would have the authority to open branches even in states where the cooperative movement is more successful than in the five states suggested by the Informal Group. According to Mr. Miles, an All-India Corporation would be able to command greater resource and managerial skill. It will also have more flexibility in operation.

A line of credit should be available to the cultivators who are still outside the fold of cooperatives. He has suggested safeguards against the Corporation working in a manner detrimental to the cooperative movement. He also recommends that regardless of the type of organisation developed to supplement the cooperatives, they should be strengthened as rapidly as possible, so that they can carry on the ever-increasing responsibility of serving cultivators.

(iii) **State Taccavi**: Taccavi will continue to play an important role as a line of credit for a long time to come. In IADP areas, cooperative credit had to be supplemented by taccavi. The Government of India have planned to cover 32.5 million acres by the intensive cultivation of the high-yielding varieties of food crops over the Fourth Five Year Plan period to secure an additional production of 25 million tons. It is essential for the success of this programme that credits for the necessary inputs like seeds, fertilizers, pesticides, etc. which will be required in much larger quantities, are ensured. Until cooperatives in those areas are in a position to shoulder the entire responsibility of providing 100 per cent credit, needed by all the cultivators in these areas, or a credit Corporation or Corporations are established, Government will have to continue to provide a supplementary line of credit through taccavi. The best form it can take would be loans in kind, such as seeds, fertilizers, pesticides, and essential implements beyond the cultivators' reach or not readily available, the supply of which has to be arranged. There is a big gap in the requirements for medium term credit and its supply from existing institutions. The quantum of medium term credit disbursed by Central Banks and primary credit societies does not exceed 10 per cent of the total loans advanced. Lastly, in states where the Land Mortgage Bank structure is not well developed, the state governments will have to continue advancing long term loans as well. There is also another area where nothing can replace government taccavi, namely, the areas where agriculture is conducted by backward subsistence type cultivators who are mostly from the scheduled tribes and castes and other backward classes. The cooperative societies as well as the Agricultural

Credit Corporations, if established, would have to operate on business lines adopting sound banking practices having regard to increasing agricultural production. They cannot undertake the responsibility of advancing credit, which is more or less of the subsidy type to such backward areas with marginal and sub-marginal cultivators.

The responsibility for taccavi loans should be centralised in a single department, preferably, Agriculture, having specialised staff for their administration. The staff should effectively supervise the utilisation of the loans as well as their recovery.

(iv) **The State Bank of India and Commercial Banks:** The State Bank of India has a scheme of starting Rural Pilot Centres to play a more effective part in the direct as well as indirect provision of rural credit and to the extent possible, to fill the gap in the working of the agricultural credit institutions in rural areas. Broadly, the idea is to establish "Pilot Centres", *i.e.*, each selected branch, existing or new, will cover a number of surrounding villages, and not merely the town or large village in which the branch is located. It is proposed to work out an integrated scheme to expand the bank's rural financing activities for agricultural production and marketing along with its other normal functions. As experience is gained, more centres may be opened and activities expanded. The scheme would be coordinated with other development schemes. Commercial Banks can play a larger role provided there is an agency for refinancing.

(v) **Foodgrains Corporation of India:** The Foodgrains Corporation of India is permitted by law to extend credit facilities and it has also been accepted as a policy that it could advance loans to cultivators against promises of delivery of grains after harvest. It is intended to make the maximum use of existing cooperative institutions in the areas of its operation. The credit advanced by the Foodgrains Corporation will, however, be marketing credit but it will incidentally help production, as the borrowers may utilise all or some of the funds to invest in production requirements. As the Corporation will have direct dealings only with a limited number of large producers, its impact is not likely to be very great. It has, however, embarked

on a pilot experiment in one state of advancing seeds, fertilizers and pesticides, etc., against a contract to repay by way of a fixed quantity of grains at stipulated prices when the balance will be paid in cash.

(vi) **Fertilizer Corporation:** The Fertilizer Enquiry Committee has recommended that a Fertilizer Corporation should be established to handle procurement and distribution of fertilizer throughout the country and it should also be authorised to advance credit, which should filter down to the individual cultivator through the different agencies of wholesale and retail distribution. If this Corporation comes into being and can operate on an All India basis, it can replace State taccavi for fertilizers.

(vii) **State Seed Corporations:** A suggestion has been made that each state government should establish a Seed Corporation, which will look after the growing, procurement and distribution of pure and certified seeds. These Corporations can also advance credit.

(viii) **Agro-Industries Corporations:** Agro-Industries Corporations will be set up in some states to look after the supply of agricultural implements and undertake their manufacture wherever possible. These Corporations, if established, can also advance credit by way of hire-purchase terms to cultivators.

CONCLUSION

In order to implement a programme of increased agricultural production which has become imperative, it is necessary to adopt a realistic policy of credit for agriculture. Any doctrinaire approach should be avoided and the aim should be to make available all the credit needed by agriculturists through any agency that it is possible to create excluding, of course, the private money-lender. The Cooperative Movement will continue to occupy the predominant role but its deficiencies have to be removed. Agriculture in India, however, cannot wait till the movement has been revitalised to meet the entire credit needs of the cultivator. Increase in agricultural production must come first and if the cooperative movement is inadequate or lags behind,

supplementary lines of credit have to be organised either as a temporary or a permanent measure. The approach should be flexible enough and this calls for a multi-agency approach, as indicated in the preceding paragraphs. The multi-agency approach, however, would call for coordination at all levels from the Central Government down to the development block. As financial resources and necessary supplies are likely to be very much short of the requirements for many years to come there is no room for competition by different agencies providing agricultural credit, or one agency working to the detriment of another and preventing its growth. The different operations of providing credit should be complementary and there should not be any overlapping and over-financing of areas or individuals. A coordinating body should be established at the Centre with the participation of concerned Ministries and Departments, the Reserve Bank of India, State Bank of India, Life Insurance Corporation, representatives of Commercial Banks, Agricultural Credit Corporation or similar Corporations and representatives of the unions of cooperative institutions. The State level coordinating bodies should also follow the same pattern with representatives of regional or local agencies of All-India organisations and appropriate state organisations. At the district and block levels, the concerned local officers and representatives of cooperative institutions and Panchayati Raj, should find a place. These bodies should assess the local requirements and the expected resources and chalk out areas of operation and fields of action for each agency as well as deciding upon broad policies. If agriculture is to receive the highest priority in the Fourth Plan, it should be translated into action by putting the credit structure on a firm footing to finance agricultural operations.

COOPERATIVE MARKETING OF AGRICULTURAL PRODUCE

S. S. PURI

APPROACH TO AGRICULTURAL MARKETING

Role of the State

In India, as in many other under-developed countries, there has been a natural pre-occupation with the problems of agricultural production and this has tended to keep the problems of agricultural marketing in the background. It is only in the post-Independence period that concerted efforts were made in India for the implementation of measures directed towards the improvement of the agricultural marketing system. One of the principal planks of this programme was the enactment of the Agricultural Produce Markets Act and regulation of markets. Up to the end of January, 1967, 11 States and 4 Union Territories had passed such Acts and brought 1758 markets under statutory regulation. It is expected that the remaining 700 markets or so would be brought under such regulation in the course of the Fourth Plan period.

The effectiveness with which the Agricultural Produce Markets Act was enforced varies from state to state. There has been a tendency in some States to restrict the scope of the regulation to a limited number of commodities. For instance, food grains are not yet regulated in the Andhra region of Andhra Pradesh. Similarly, the extension of Agricultural Produce Markets Act to special commodities such as fruits and vegetables, tobacco, etc., has been done only to a very limited extent.

Along side the regulation of markets, efforts have been made to introduce grading services on a voluntary basis for a variety of farm products with a view to facilitating internal marketing. Compulsory quality control before export has also been enforced for a number of commodities. In order to make an impact on the marketing system at the primary level and to give benefit to the producers, a scheme for establishment of grading units by the state has been introduced. By the end of the Third Plan, 356 grading units had been set up. In addition, a number of oil grading laboratories have also been established.

Other activities undertaken by government relate to marketing research and marketing extension. The research studies are, at present, restricted to foodgrains, oilseeds and a few important fruits and vegetables. Side by side, measures have also been taken to provide training courses for the marketing personnel. Finally, while regulation and control of forward markets have been undertaken for some time, recently the government had established an Agricultural Prices Commission and introduced a policy of fixation of minimum prices for important crops. All these indicate a new awareness of the role of marketing in agricultural development.

Through various regulatory measures and the administration of a positive agricultural price policy, the state can no doubt help to create the minimum conditions necessary for an orderly and efficient system of agricultural marketing. The extent of orderliness and efficiency actually achieved is, however, largely dependent upon the agricultural producers themselves and herein lies the role of voluntary action by such producers through cooperative organisations.

Need for Cooperative Marketing

The need for cooperative marketing in India arises from a variety of factors. In the first place, these factors are connected with the malpractices in the existing system of agricultural marketing. Some of these malpractices, such as arbitrary deductions from the price of the produce, manipulation of the

weights and scales, and the collusion between the broker and the buyer, gained wide notoriety in the past. In several markets, the marketing charges are still found to be numerous and variable. In some of these cases, the charges are fictitious, *i.e.*, the service or the purpose for which the levy is made does not exist.

The various studies made by the Directorate of Marketing, Government of India, reveal a wide variation in the market charges and also a lack of uniformity as to the party who is to pay the particular charges. The rural Credit Survey Report had described the prevalent position as follows :

“While standards of marketing have improved in most of the relatively few regulated markets which have been established, a number of malpractices still exist even in these, since personnel and enforcement are two great problems, not always sufficiently attended to, much less solved. Sometimes the malpractices take a fresh lease of unauthorised life just outside the market, for the private interests are strong, the advantages of avoiding strict regulation are many and the producer is in no position to seek eventual advantage and protection from law at the cost of the immediate disadvantage involved in the loss of powerful customers who are also sources of credit and finance. Moreover, there is the very grave lacuna that no control at all is exercised over village sales.”¹

The effect of various malpractices tends to be aggravated by the circumstances that most of the cultivators are indebted to the trader, who is also the money-lender. In this situation, the marketing system, in the words of a U. N. Report “usually degenerates into a truck system that embraces the weaker partner in a complicated network of indebtedness, obligations and eventual economic exploitation”.²

The need for cooperative marketing does not rest merely on the fact that it can assist in minimising various malpractices. There is also a positive aspect to cooperative marketing.

¹ All India Rural Credit Survey Report, Vol. II, p. 105.

² Pamphlet on Rural Progress through Cooperatives.

It is envisaged that cooperative marketing of agricultural produce should help to ensure a better return to the primary producer. This is partly the result of the educative process which is set in motion when there is a system of marketing by the farmers and for the farmers. On this point, one cannot do better than to quote the Cooperative Planning Committee (1945) :

“No influence is so important in the economic education of farmers as their own efforts in cooperative marketing. The very attempt on the part of the farmers to solve their problems teaches them basic economic truths. The operation of cooperative marketing organisation teaches farmers that agriculture is primarily a form of business. Cooperative marketing also teaches farmers that the problem of marketing is closely related to the problem of production. The marketing organisations have found from experience that the demand for agricultural products is increased by an improvement in production methods which results in products of higher quality. Again, when farmers themselves undertake marketing programmes, they become familiar with practices which greatly reduce the economic value of their produce. Cooperatives also serve an important function in supplying information on the many factors which affect the economic status of farmers.”³

Apart from the influence which marketing cooperatives can exercise on the level and quality of agricultural production, the marketing cooperatives aim at helping the primary producer to capture a larger share of the consumer rupee. At present, various marketing functions such as assembly, storage, processing, insuring, financing, standardising, sale and transportation are performed by a large number of persons who play the part of middlemen and market functionaries. Often there are more such functionaries than are necessary and their charges are generally out of proportion to the services that they render. As noted by the Prices Sub-Committee, there is “wide disparity

³ Report of the Cooperative Planning Committee, p. 58-59.

between the price at which the produce is sold to the consumer and the price which the cultivator actually receives, with the result that much too low a proportion of the consumers' rupee reaches the cultivator".⁴

The experience of successful cooperative marketing societies shows that price spread between producer and the consumer can be reduced to the advantage of the primary producer. A co-operative marketing society, by bargaining for all its members, can obtain advantages not obtainable if individual members sell independently. This is essentially a reflection of the fact that, in the conditions of Indian agriculture, the average farmer with his tiny holding, contributes a very small share to the marketable surplus. This is almost like a drop in the ocean. On the other hand, the marketing power of a large network of federally organised marketing cooperatives can make itself felt. The cooperative marketing system can grade and pool the produce and spread the sales over a favourable period. It can also stimulate demand by advertising and other means that would be uneconomical for the individual farmer.

It is pertinent to mention that cooperative organisations of agricultural producers appear to constitute an essential condition for the successful implementation of various regulatory and administrative measures that might be taken by the state for establishing or improving the agricultural marketing system. Even the functioning of the marketing boards is considerably facilitated if there is a network of producer cooperatives operating in collaboration with them. It is in this context that the Tea Board and the Coffee Board in India have lately evinced considerable interest in organising cooperatives for processing of tea and coffee.

Finally, the need for the development of cooperative marketing arises from the consideration that such development is essential for a large scale expansion of cooperative credit. In the scheme of integrated development of cooperative credit and marketing as advocated by the All India Rural Credit Survey Report, marketing cooperatives can act as agents for the recovery of

⁴ Report of the Agriculture Prices Sub-Committee.

loans advanced by credit societies and thus provide a built-in mechanism for recovery of production finance issued by credit cooperatives.

PROGRESS OF COOPERATIVE MARKETING

Generally speaking, prior to Independence, only a few sporadic efforts were made in the development of cooperative marketing. In 1945, the Cooperative Planning Committee recommended that, within 10 years, 25 per cent of the total annual marketable surplus should be sold through cooperative organisation, and, for this purpose, a marketing society should be organised at each of the 2000 mandis in the country. It appeared that no planned efforts were made to implement this recommendation. In 1951, when the All India Rural Credit Survey was carried out, it was observed that out of 75 districts selected for the survey, there was no cooperative marketing in as many as 63 districts. Out of the remaining 12 districts, the share of cooperatives in marketing of agricultural produce exceeded one per cent of the total sales to all agencies in only 5 districts. The overall situation was described by the Rural Credit Survey Committee as follows :

“A very—very few—fairly successful cooperative marketing societies do exist in India; some of these may be significant pointers to the lines on which future progress is possible but, as at present contribution towards bringing about a system in which marketing is by the cultivator and for the cultivator, the part which they occupy in the total picture is wholly insignificant. All the cooperative marketing societies in India put together still fail to catch one's attention as anything important, lacking in this respect even that purely numerical impressiveness which on paper credit societies manage to marshal between themselves.”⁵

⁵ All India Rural Credit Survey Report, Vol. II, p. 106.

Development Under Five Year Plans

In the First Five Year Plan, the need for the development of cooperative marketing side by side with cooperative credit was emphasised. However, no specific targets in this regard were laid down and consequently there was no planned effort to strengthen or expand cooperative marketing in the First Plan period. In the meantime, the Rural Credit Survey Report drew pointed attention to the fact that "often enough, the cultivator's position is that of having to bargain, if he can, with someone who can command the money, commands the credit, commands the market and commands the transport".⁶ The Report stressed the need for cooperative marketing societies at various levels. It also recommended financial assistance to cooperative marketing societies at the initial stages. Such assistance was to cover State participation in the share capital, loan and subsidy for godowns and subsidy for managerial staff.

In pursuance of the recommendation of the Rural Credit Survey Report, considerable emphasis was laid on the development of cooperative marketing in the Second Five Year Plan. The Planning Commission observed :

"The primary consideration for the development of agricultural marketing is to so reorganise the existing system as to secure for the farmer his due share of the price paid by the consumer and subserve the needs of planned development. To achieve these objects malpractices associated with buying and selling of agricultural produce have to be eliminated, arrangements made for the efficient distribution of marketable surpluses from producing to consuming areas and cooperative marketing developed to the maximum extent possible. Rural marketing and finance have to be integrated through the development of marketing and processing on cooperative lines."⁷

Under the Second Five Year Plan a network of primary

⁶ All India Rural Credit Survey Report, Vol. I, p. 102.

⁷ Second Five Year Plan, p. 276.

marketing societies was established. Against a target of 1800 marketing societies, as many as 1869 societies were organised or reorganised and State partnered under the Second Plan. This programme has been further continued in the Third Plan and 452 new primary marketing societies were added by the end of plan. It is estimated that by the end of Third Plan all important secondary markets were covered by marketing societies. Apart from these territorially organised marketing societies, there are also over 500 specialised commodity marketing societies dealing in cotton, arecanut, coconut, fruit and vegetables, tobacco, etc.

Along with the development of the structure at the primary level, the higher tiers of cooperative marketing structure were also built up under the Five Year Plans. The higher tiers now consist of about 160 district level marketing societies, 20 state marketing societies, one State Fruits and Vegetable Federation and one State Arecanut Marketing Society. At the All India level, there is a National Agricultural Cooperative Marketing Federation.

As in the case of cooperative marketing structure, the development of agricultural marketing operations by cooperatives is a relatively recent activity. During the First Plan, there was practically no expansion in the volume of agricultural marketing operations. It is only from the beginning of the Second Plan that marketing operations were developed.

Cooperative marketing of agricultural produce is being undertaken by various types of cooperatives such as primary marketing societies, district and state level cooperatives. Processing societies are another important agency. In some areas, even primary agricultural credit societies undertake sale of agricultural produce either as agents or as owners. The following table indicates the progress of marketing of agricultural produce by various types of cooperatives :

Among the cash crops, sugarcane constitutes the largest single commodity accounting for Rs. 146 crores during the year 1965-66, in the total value of agricultural produce marketed by cooperatives. Sugarcane supply societies mostly located in

Uttar Pradesh, Bihar and Punjab have marketed sugarcane of the value of Rs. 90 crores. This was facilitated by the Cane Acts which make it obligatory on the part of the private sugar factories in these three states to purchase their sugarcane requirements through these societies. Cooperative sugar factories have accounted for another Rs. 56 crores, being the value of sugarcane crushed by them during the year 1965-66.

Year	Value of agricultural produce marketed. (Rs. in crores)
1950—51	47
1955—56	53
1960—61	179
1963—64	224
1964—65	301
1965—66	360

The following table indicates the commoditywise break-up of the value of agricultural produce marketed by cooperatives during the years 1963-64, and 1965-66.

Commodity	1963-64	1964-65	1965-66
	(Rs. in Crores)		
1. Foodgrains	40.00	99.14	137.00
2. Sugarcane	98.71	114.35	146.00
3. Other crops	85.05	85.34	77.00
	<u>223.76</u>	<u>298.84</u>	<u>360.00</u>

Among the other cash crops handled by cooperatives, mention may be made of cotton, groundnut and certain plantation crops such as arecanut, coconut, cashewnut, etc. The value of these crops marketed by cooperatives was Rs. 77 crores during 1965-66. In the field of cotton marketing, it is estimated that the value of cotton marketed by cooperatives amounted to

Rs. 25 crores during 1965-66. The share of cooperatives in the marketing of cotton was nearly 13 per cent during 1965-66. Gujarat has recorded remarkable progress in the field of cooperative marketing of cotton. Cooperatives have accounted for nearly 30 per cent of the total production of cotton in that state. In certain areas of Gujarat, a major portion of cotton is marketed by cooperatives.

Cooperative marketing societies have also made significant progress in the marketing of plantation crops such as arecanut, coconut, cashewnut, cardamom, pepper, etc. This activity is mainly concentrated in the states of Mysore and Kerala. The total value of plantation crops handled by cooperatives is expected to be of the order of Rs. 8 crores during 1964-65. In regard to arecanut, about 13 per cent of the total marketed surplus of arecanut in the country is handled by cooperatives. In Mysore State a third of the State's arecanut production is handled by cooperatives. Cooperatives have also made some progress in respect of other plantation crops such as coconut, cardamom, pepper, etc.

The progress in the field of cooperative marketing of foodgrains has been limited up to 1963-64. The following table indicates the slow though upward trend in the past few years :

Year	Value (Rs. in crores)
1958—59	10.5
1959—60	24.0
1960—61	32.0
1962—63	32.0
1963—64	40.0
1964—65	99.0
1965—66	137.0

Marketing of foodgrains by cooperatives was taken up on a priority basis during 1964-65 and 1965-66 when a number of measures were taken to develop this activity. These were largely connected with state trading and procurement by government

in different states. The Cooperatives have also played a substantial role as agents of the Food Corporation of India. The result of these measures was that the value of foodgrains handled by cooperatives rose from Rs. 40 crores in 1963-64 to Rs. 99 crores during 1964-65 and to Rs. 137 crores during 1965-66.

Considerable emphasis has been laid on the development of cooperative marketing in an intensive manner in I.A.D.P. districts. At the inception of the programme, the number of marketing societies was 204 only. It increased to 262 at the end of June, 1966. Out of a total of 243 secondary markets, with the exception of 3 (2 in Alleppey and 1 in Burdwan), all the others have been covered by a marketing society. The total membership of marketing societies has increased from 1.35 lakhs to 1.96 lakhs. The bulk of the increase was accounted for by Thanjavur, Ludhiana, Burdwan, Raipur and Mandya districts. The cooperative marketing of agricultural produce in all these districts which was annually of the order of Rs. 288 lakhs at the inception of the programme increased to Rs. 1210 lakhs during the year ending June, 1966. Thanjavur, Raipur, Mandya, Surat, Aligarh, Ludhiana, Pali, Palghat and Sambalpur districts have made substantial progress in this regard.

Assessment of Progress

The Third Five Year Plan envisaged that in the final year of the Plan cooperatives should handle agricultural produce worth about Rs. 360 crores. This target has been accomplished. However, the contribution to the accomplishment of the target has been extremely uneven between different states. While sizable progress has been registered in some states, cooperative marketing is rather limping in several other areas. To some extent it is a reflection of the weakness of the corresponding cooperative credit structure.

Another way of looking at the performance in this field is to assess the overall picture in relation to individual societies. The figures for the latest year are not available. However, in

1963-64, the 2260 marketing societies handled produce worth over Rs. 5 lakhs each, 640 societies handled agricultural produce worth between Rs. 1 lakh and Rs. 5 lakhs each, while 1011 marketing societies handled produce worth less than Rs. 1 lakh each.

PROBLEMS OF COOPERATIVE MARKETING

Operational Problems

It has to be recognised that cooperative marketing societies in India are comparatively of recent origin and generally they have not had much time to establish themselves on a firm footing. Moreover, they have to compete against strong vested interests. It is noteworthy that, while cooperative credit can expand in absolute terms without necessarily involving a diminution in the volume of private money lenders' credit, cooperative marketing, by and large, can expand only at the expense of the private trade. It is, therefore, not surprising that while cooperative endeavours in every field encounters vested interests, the opposition to any measures which may facilitate cooperative marketing is particularly strong.

To begin with, cooperative marketing institutions have to function within the framework of the general agricultural marketing structure. For a variety of reasons, this structure is not uniform throughout the country. There are three broad sets of arrangements prevalent in the country. The first set of arrangements is to be found in some of the northern states, particularly in Punjab, Uttar Pradesh, Rajasthan and Madhya Pradesh. These are areas where well-established secondary markets have come up and a system of *katcha arhatiyas* operates. The second set of arrangements is to be found primarily in the jute growing states of West Bengal, Assam, Orissa and Bihar, where, in many areas, secondary markets are of no great importance from the point of view of the primary producer who parts with his crop in his own village to an itinerant merchant or in the neighbouring weekly or bi-weekly *hat*. The third set of arrangements relate to plantation crop

areas such as Kerala which have characteristic problems of their own. In between these three sets of arrangements there are several border line situations. In any case, cooperative marketing institutions, in order to attract the growers, have to evolve policies and practices which take full cognizance of the prevailing marketing arrangements. In other words, in the field of cooperative marketing, broadly speaking, it is difficult to prescribe all-India practices and policies.

A crucial handicap in the field of cooperative agricultural marketing has been the lack of support and guidance to primary marketing societies from higher tiers. Most of the apex marketing societies too, are comparatively of recent origin. At present, there is one apex society in every state as well as in almost every Union Territory. Of these, only three existed at the beginning of the 1st Plan. The rest came into being during the First/Second Plan periods. Thus unlike the State Cooperative Banks, State Cooperative marketing societies have not had much time to gain the necessary experience. The National Cooperative Development Corporation has recently sponsored a scheme under which apex marketing societies are being assisted to create suitable cells for rendering promotional and advisory services to their member societies. This scheme should help the apex marketing societies to play an effective role in the development of cooperative marketing at the primary level.

Another handicap has been the preoccupation of marketing societies with supply and distribution functions. In many areas, marketing cooperatives are the sole distributors of chemical fertilizers. Some of them have a sizable turnover in supplying agricultural needs like seeds, implements and pesticides and also consumer articles in rural areas. Thus the resources and attention of their managerial personnel were largely taken up with supply and distribution functions. This naturally resulted in indifferent attention being paid to development of agricultural marketing. In fact, until very recently, the annual statistics about the turnover of marketing societies did not make a distinction between the distributive and marketing functions.

To strengthen the financial position of marketing societies and to enable them to maintain necessary managerial staff and construct godowns, financial assistance has been made available by government. One of the principal requirements of marketing cooperative is short-term marketing finance. In recent years, considerable thought has been given to this subject and in particular the State Bank of India has started playing an increasing role in this field. During 1965-66 the State Bank of India sanctioned limits to marketing cooperatives to the extent of Rs. 144.47 lakhs. The State Bank of India also sanctioned limits during 1965-66 to the State Cooperative Banks of Maharashtra, Madhya Pradesh, Madras, Mysore and Kerala for financing normal operations of marketing/processing societies to the extent of Rs. 29.60 crores including financing of foodgrains procurement. Despite these developments, lack of adequate financial accommodation continued to be an inhibiting factor in a number of cases.

Another set of limitation of marketing cooperatives relate to their trading practices. In order to enable the grower to get the best price, cooperative marketing has to include processes such as grading, pooling and bulking of the produce (and processing where necessary) and finally to arrange for their sale in the most favourable markets. Such a system envisages that the produce brought in by an individual grower would be sorted out into separate grades and that he would be given certain amount of money as an advance price. The produce of each grade would then be pooled and processed and finally disposed of in the most favourable market over a period of time. At the end of the period, the grower is paid back the average pooled price based on the gross earnings in respect of each grade minus the necessary incidental and handling charges by the cooperatives. Such practice of pooling has been adopted with a considerable measure of success by cotton cooperatives in Gujarat. This system has the obvious merit of ensuring that the marketing cooperatives as institutions do not undertake any undue risk. At the same time, it enables the marketing cooperative to negotiate for a good price in the most favourable market on the basis of large quantities.

The above system of grading and pooling cannot be adopted by all the marketing cooperatives with immediate effect. In the first place, most of the marketing cooperatives are not equipped to undertake grading of agricultural produce brought by the members. In the second place, in many areas, an average grower is accustomed to selling his produce in the mandi against immediate payment.

Recently, a scheme has been sanctioned for enabling marketing and processing cooperatives to enlarge their operations in regard to outright purchases of agricultural produce. Under this scheme, cooperatives are eligible for a contribution to a price fluctuation fund at the rate of 2 per cent of the value of agricultural produce purchased by them outright from their members or from members of affiliated village societies. In respect of commodities which are disposed of by cooperatives after processing and where the fluctuations in prices are likely to be relatively high or in respect of commodities which are exported outside the country, it may, however, be open to the state governments to raise the rate of government contribution up to a maximum of 5 per cent. It is contemplated that in due course this scheme would enable the small grower to come within the fold of cooperative marketing structure.

Finally, a word about the problems of the personnel for cooperative marketing. It is necessary for cooperative marketing societies to be manned by persons who have specialised knowledge of marketing techniques as well as familiarity with cooperative methods of work. This requires not only arrangements for training but also building up of a pool of personnel within the cooperative marketing structure. With this end in view, it is proposed that, under the Fourth Five Year Plan, every apex marketing society will try to create a pool of personnel for being trained and loaned out to their affiliated societies. In due course, this pool can grow into a common cadre. In the meantime, the Committee for Cooperative Training, set up under the National Cooperative Union of India, examining the measures necessary for reorientation of the existing arrangements for the special course in cooperative marketing conducted

by the Committee at their Training Centres in Indore, Madras and Poona.

Problems of Coordination and Administration

During the last three decades, several changes have taken place in the pattern of sales of agricultural produce in the country. The development of cooperative marketing, legislation for standardisation of weights and measures, setting up of warehousing corporations, regulation of forward trading, the awareness of the need for establishment of regulated markets on the one hand, extension of grading services, extension work and dissemination of market intelligence on the other, have helped in providing favourable environment for producers to obtain better returns. The administrative set-up concerned with the development of marketing in the Centre and in the states is presently concerned only with providing marketing services like administration of regulation of markets and supervision of grading. Separate agencies have been set up for the administration of warehouses, weights and measures, forward markets, cooperative marketing, etc. The programme of marketing, processing and storage are complementary to each other and have the common objective of improving the economic conditions of the farmer. The pace of development in regard to these activities has not been sufficiently fast and uniform in all the states. Due to the multiplicity of organisations administering different aspects of the programmes, each pursuing its own isolated pattern of development, the impact of these programmes on the rural economy in general has not been very significant. It is, therefore, necessary to ensure a closer liaison between the various official agencies concerned with the development of marketing, processing and storage not only at the central and state levels but also at the district and market levels in order to forge an integrated approach to the implementation of programmes in these fields.

(I) **Central level:** At the central level, the following organs of government are directly or indirectly concerned with the programme of marketing, processing and storage

1. *Ministry of Food, Agriculture, Community Development and Cooperation.*

- (a) Department of Agriculture
 - (i) Directorate of Marketing & Inspection.
 - (ii) I. C. A. R.
 - (iii) Extension Directorate (Inspection & Storage in I. A. D. P. and I. A. A. districts)
- (b) Department of Food
 - (i) Storage Division in the Department.
 - (ii) Food & Nutrition Board.
 - (iii) Central Warehousing Corporation.
 - (iv) Food Corporation of India.
- (c) Department of Cooperation.
- (d) National Cooperative Development Corporation.

2. *Department of Supply & Technical Development*

- (i) Directorate General of Technical Development.
- (ii) Development Council for Food Industries.

For ensuring coordination at the central level, there is, at present, a small committee constituted by the Department of Agriculture consisting of representative from that Department, Central Warehousing Corporation, and the Department of Corporation.

(II) **State level:** At the state level the pattern of organisational arrangements varies from state to state. In one or two states, there is a separate Director of Agricultural Marketing of the status of a head of department. But in most other states, the work relating to agricultural marketing is handled in a division under the control of the Director of Agriculture or the Registrar of Cooperative Societies.

At the Secretariat level also, there are several variations. Apart from these Directorates/Departments/Divisions within the state governments, there are other agencies also concerned with these programmes :

- (1) State Warehousing Corporations.

- (2) Registrars of Cooperative Societies.
- (3) Regional Directorates of Food of the Department of Food or the Food Corporation of India as the case may be.

There does not appear to be adequate coordination between these agencies at the state level.

For the promotion of the programme of cooperative processing almost all the states have constituted high-level committees under the chairmanship of the Minister in charge of Cooperation. The other members of the committee are usually Ministers and heads of other concerned departments such as industries, agriculture, cooperation, finance, etc.

At the district level, the district officers in charge of agriculture and cooperation are generally concerned with these programmes. Apart from this, the Zila Parishads have a vital role to play in the development of these activities. No satisfactory arrangements for coordination of these activities at the district level have so far been evolved. At the market level, however, in a majority of the states, there is provision for a representative of the cooperative marketing society to be nominated on the regulated market committee.

It has been observed that in the states of Maharashtra, Mysore and Orissa where the Registrar of Cooperative Societies is also in charge of agricultural marketing, the coordination between the Agricultural Marketing Department and the Cooperative Department had been possible to a large extent. This arrangement could be considered by other state governments also.

Problems at Linking Marketing with Credit

Linking of cooperative marketing with cooperative credit has been recognised as an integral feature of the programme of cooperative development. It envisages that credit cooperatives should offer production credit to the members on the basis of the crops grown by them and arrange for the recovery from the sale proceeds of the respective crops.

For effective linking of credit with marketing one of the requisites is establishment of an organic link between credit institutions and marketing societies. In recent years there has been considerable progress in affiliating primary credit societies to marketing cooperatives. While in 1955-56, 6,385 societies out of 159,939 village societies were affiliated to marketing societies, the corresponding position at the end of 1964-55 was that out of 2.1 lakh village societies, 1.25 lakh societies were affiliated. In other words, the percentage of affiliated village societies has risen from about 3.5 per cent to about 60 per cent. On the operational side also some progress has been registered. During 1964-65, it is estimated that nearly Rs. 30 crores of production credit advanced by village societies was recovered from the sale proceeds in respect of agricultural produce marketed by cooperatives. This recovery accounts for approximately 10 per cent of the total loans recovered during the year. The performance in this respect is considerably uneven in different states.

One of the prerequisites for forging an effective link between cooperative credit and cooperative marketing is that the concerned institutions in both the sectors should develop the level of business operations and competence of a sufficiently high order. Apart from institutional growth, the linkage will also require development of suitable procedures and also provision of requisite incentives and disincentives to individual borrowers. It would also be necessary to involve the concerned central cooperative banks in this process. Finally, as a strategy, it might be desirable to introduce compulsory linkage for a percentage of the loan, the percentage being determined for each area locally by the concerned non-official and official workers in charge of cooperative credit and marketing institutions.

CONCLUSIONS AND RECOMMENDATIONS

Under the Fourth Plan, the intention is to develop the marketing operations of cooperatives to the extent that is necessary to enable them to exercise wholesome influence on the pattern of agricultural trade.

The finance required for this purpose is estimated to be of the order of Rs. 200 crores. The State Bank of India and other concerned agencies have to play a very significant part in providing the funds.

Apart from the strengthening and the development of co-operative marketing structure in the aggregate, it will be necessary for individual societies to develop competence and expertise taking into account the local market conditions and the commodities to be handled. In the development of such competence higher tiers of cooperative marketing structure must provide guidelines to their affiliated organisations.

During the course of the Fourth Plan the strategy of development of agriculture envisages intensive development of particular crops in selected areas. This development will need to be correlated to provision of suitable marketing and processing facilities in the cooperative sector. The same kind of perspective planning will be necessary to even larger extent in the case of areas selected for intensive fruit and vegetable cultivation.

Finally, it must be stressed that in order to implement effectively the various schemes concerned with the promotion and growth of cooperative marketing institutions, the closest liaison must be maintained between cooperative marketing and storage not only at the central and state level but also at the district and market levels, with a view to forge an integrated approach. This will require effective functioning of suitable coordination committees at the central and state levels as also at the level of the Zila Parishads and individual mandis.

THE INTENSIVE AGRICULTURAL DISTRICT PROGRAMME AND PUBLIC ADMINISTRATION*

Some Lessons Learned in the Package Programme for Agricultural Development

I. INTRODUCTION

The Intensive Agricultural District Programme (IADP), completed its fifth year in the spring of 1966. It is in effect in 15 of India's 325 districts. Approximately a million of the nation's more than 50 million cultivators are taking part in it.

IADP is a Government of India programme which uses selected districts to demonstrate a coordinated "package" of related practices to cultivators as the quickest and most effective way to raise their yields and income. These practices include using better seeds, treating seeds to protect them from disease, using improved farm tools, the right amount of fertilizers at the right time, and taking suitable plant protection measures. The package varies according to local conditions, but it always includes a combination of interacting, scientific, farming practices.

The IADP, popularly called the "Package Programme", pioneered new concepts and methods of agricultural development. It also has pioneered in both agriculture and public administration.

The lessons Package Programme staffs have learned are

*The material in this paper was prepared in the Ford Foundation office of the Intensive Agricultural District Programme. It is based largely on evaluation reports, recommendations of special IADP Conferences, and special reports by Foundation consultants.

vital to India in its drive to become self-sufficient in food production. The value and need of this Package Programme experience is underscored by the government's decision to expand the package concept to more than 100 districts during the Fourth Plan in what is known as the IAA (Intensive Agricultural Areas) Programme.

IADP experience has demonstrated how improved administration can advance agriculture. But IADP has also revealed unresolved administrative difficulties which still handicap agricultural production and threaten the success of the nation's food production efforts.

This seminar on "Administrative Aspects of Agricultural Development" is concentrating on four areas : planning for agricultural development; agricultural extension; programme administration; and union-state-field agricultural relationships. This paper is chiefly concerned with programme administration.

Package Programme experience indicates that agricultural extension methods alone are not the most effective way of working with Indian farmers. The programme is now organised around an education-cum-action approach at the district operating level which is essential for the extensive, fast-moving kind of programme India needs.

Although India's crop yields are among the world's lowest, the country can increase its food production considerably. India is a potentially productive land. Its water resources can be exploited more fully and managed more sufficiently. Research is under way on promising new crop varieties. Farmers are using more and more chemical fertilizers and other essential inputs. Moreover, the country is moving towards effective national price policies which offer cultivators the incentive to increase their food production. Finally, India has many millions of cultivators who are more than ready for improved farming.

But all this is not enough, as India's continuing agricultural crises have shown to date. It is also essential to have effective administration at centre, state, and district levels.

The Package Programme has followed the centre-state-district line of administration. But its most important contribution

to administration has been to build the base for the administrative structure for this integrated programme at the *district* rather than at the block level which was the base for many individual agricultural schemes in the past.

The IADP district staff is headed by a Project Officer with a staff of agricultural specialists and a deputy registrar of cooperatives whose responsibilities are chiefly concerned with the Package Programme.

The important difference between the District Project Officer and the District Agricultural Officer is that instead of dealing mainly with technical problems, the Project Officer is a *planner*, and *organiser*, and the *leader* of an intensive agricultural development programme.

On balance, Package Programme administration has been successful enough to confirm the initial belief in the effectiveness of this approach. But it has encountered enough difficulties to show that further steps must be taken to clear up these problems, if the full potential of the programme is to be realised. This review will stress the problems and the lessons learned. These problems must be solved if Indian agricultural development is to progress satisfactorily. The successes are apparent, but administrative obstacles will continue to hold back progress unless the necessary changes are expedited.

A single administrative problem may not be large or overwhelming. But when a whole series of them are encountered in the administration of a single programme such as IADP, the cumulative effect is to bog down the development of agriculture.

The Package Programme administration to date has effectively demonstrated how to organise and implement such an intensive agricultural programme. Many officials concerned with it now *know* what the requirements are for administering such a programme. But they have not been in a position to meet the requirements requisite for successful public administration.

The following programme review indicates the procedures which were followed in organising and implementing the IADP and some of the difficulties which were encountered both in the substantive and administrative areas.

II. THE GENESIS OF THE PROGRAMME

The Indian Government asked the Ford Foundation to bring an agricultural production team from the United States to India in 1959 to help review its agricultural policies and progress.

The team's report, "India's Food Crisis and Steps to Meet It", pointed out that the gap between production and food needs would grow unless a programme was undertaken at once to increase food production substantially. It recommended an allout effort to increase food production which would concentrate scarce resources in the more favourable agricultural areas. The aim was to obtain maximum returns from limited technical personnel and scarce food production resources.

The Indian Government accepted the team's recommendations and asked the Foundation's help to work out such a concentrated, intensive agricultural programme.

A second Foundation team came to India in October 1959 and helped Indian officials develop the Intensive Agricultural District Programme, which later became known as the Package Programme.

Actually, the term "package" includes both an on-the-farm package of scientific practices and an off-the-farm package of related services such as adequate storage, credit and marketing facilities.

Objectives of the Package Programme

IADP was set up to fill the most obvious gap in India's agricultural development—the need to reach farmers with improved technical knowledge where conditions were most favourable for them.

It also had the four-fold purpose of :

1. Finding out how rapid increases in food production could be obtained and applied to the rest of the country.
2. Increasing cultivator's income.
3. Improving village economic resources.

4. Providing an adequate agricultural base for more rapid nationwide economic development and social betterment.

Ten points of the programme set up to carry out these objectives were :

1. Enough readily available supplies for cultivators.
2. Adequate farm credit.
3. An intensive educational programme.
4. Simple farm plans for individual cultivators.
5. Stronger village institutions.
6. Assured price incentives.
7. Reliable marketing facilities.
8. Rural Public Works.
9. Evaluation and analysis.
10. Coordinated approach.

Seven districts were chosen to launch the programme in 1960. The basic criteria used in selecting them was whether or not they had:

1. Organised and experienced Community Development and Extension Service systems;
2. Local service cooperatives capable of extending the required amount of production credit, distributing supplies and assisting with marketing;
3. Sufficient irrigation to supplement natural rainfall along with soil fertile enough to make intensive production efforts economically feasible;
4. Sufficient roads and other means of communications;
5. Enough scientifically developed and tested improved farm technology to bring about substantial and profitable increases in yields when it was applied by cultivators.

The districts chosen and the states each was located in were: Thanjavur (Madras); West Godavari (Andhra Pradesh); Shahbad (Bihar); Raipur (Madhya Pradesh); Aligarh (Uttar Pradesh); Ludhiana (Punjab); and Pali (Rajasthan). The first four districts named are chiefly rice-growing ones, the next two are largely wheat producing, and the seventh grows equal amounts of both wheat and millets.

A year later the government decided to extend the programme to one district in each of the remaining states in the country. The Foundation agreed to provide additional consultant services after meeting the needs of the original seven districts. Thus in practice, IADP included 15 districts and Ford Foundation consultants worked with all 15 to the fullest extent possible.

The eight additional districts and states in which located were: Alleppey (Kerala); Bhandara (Maharashtra); Burdwan (West Bengal); Cachar (Assam); Mandha (Mysore); Palghat (Kerala); Sambalpur (Orissa); and Surat (Gujarat).

The Ford Foundation provided approximately \$ 11 million for the initial five-year period in the original seven IADP districts. These funds paid half the additional staff costs, helped finance demonstrations and training, buy transport and demonstration equipment, set up soil testing laboratories, workshops and district information units, and helped finance research and evaluation. The central and state governments met the remaining costs. The governments met all the costs in the second eight districts.

The Foundation also provided a team of consultants who were specialists in farm management, marketing and supplies, credit, soil, crops, water, farm implements and power, poultry and livestock, plant protection, information and communications.

The USAID Mission to India and Rockefeller Foundation also assisted in the programme.

The government took a number of steps to strengthen the organisation of the programme. It established new positions and built up the required staffs. At the district level a Project Officer, working under the Collector, was put in charge of the programme. He is assisted by four or five agricultural specialists and an assistant or deputy registrar of cooperative societies.

Three or four agricultural extension officers and one cooperative extension officer were added to Community Development block staffs. The average number of Village Level Workers

was increased from 10 to 20. Each one was given a maximum of five villages to work with instead of the usual 10.

The Ministry of Food and Agriculture is responsible for the administration of the programme at the Centre. There is a project officer in charge who is assisted by a corps of specialists. They provide overall direction, guidance and cooperation. State governments are responsible for carrying out the programme in the field.

The central government has two important roles. First, it must create favourable conditions for rapid agricultural development including a price policy which provides incentive to cultivators, ample technical supplies and production credit. Secondly, it must provide energetic and effective direction and leadership and it must analyse and evaluate the programme constantly. Although state governments are responsible for implementing it in the field, IADP is national in concept. It will not succeed unless the various states and districts move forward together. This calls for strong central government leadership.

Coordinating committees were used to facilitate administration. The Inter-Ministries Working Group is a central coordinating body in which the interests of various agencies are represented. Its membership has included representatives of the Department of Agriculture; Ministry of Community Development, Panchayati Raj and Cooperation; Ministry of Finance; Ministry of Irrigation and Power; Planning Commission; and the Reserve Bank of India, all under the chairmanship of the Special Secretary in the Department of Agriculture. Similar coordinative groups have been established in states and districts.

III. IMPLEMENTING THE PROGRAMME

Implementing the IADP was an enormous undertaking. Each district had to create its own programme which then had to be explained to cultivators. An individual farm plan had to be prepared for each cultivator taking part in the programme. At the same time adequate fertilizer had to be supplied and distributed, godowns built, credit extended, equipment

demonstrated, and a number of modern agricultural techniques started almost simultaneously.

IADP is quite different from previous agricultural development schemes. It is an integrated programme with the various elements of improved technology concentrated into a single "package" of scientific practices which are designed to show the cultivator how to grow more food.

IADP is a total, all-out agricultural effort applied at the local (district) level. It deals simultaneously with informal education for farm people, applying modern farming technology, intensifying the use of agricultural resources, creating effective local agricultural institutions, and organizing of all of these things, and more, into a fast-moving programme which builds up progressively as it moves along.

The necessary supporting services put into effect as the programme got underway were: adequate and timely credit; sufficient supplies of seeds, fertilizers, pesticides and improved farm tools; suitable transportation and marketing arrangements; expanded storage facilities, an intensive educational programme based on field demonstrations and technical information units; facilities for testing soil and seeds; and farm implements workshops.

The programme relied heavily on field demonstrations to educate cultivators in the new practices. Demonstrations usually were carried out on a cultivator's field covering an acre, or less which was divided into two plots. On one plot the crop was grown according to recommended practices. On the other the control plot, the usual traditional local methods, were used. These contrasting demonstration plots were established in nearly all Package district villages. Cultivators could see for themselves the difference in yields. These demonstrations showed an average return of two rupees or more for each additional rupee cultivators invested in package programme practices.

As IADP has advanced, the size of demonstration plots has gradually increased. Small two-part plots have been replaced in many villages with large demonstrations covering an entire field, a whole farm, a combination of several farms, or even a

whole village. No control plot is used in these large demonstration because as farmers' interest increases, they compare the demonstration with their own fields. These large demonstration plots were found to have far more impact on cultivators than the small, two-part ones, especially after the programme had been in effect for a few years.

Training has been a pressing and continuing need, right from the start. The Project Officer directs a three-part training programme. One part instructs district, block, and village field staffs on policy, programme objectives and the responsibilities of the staff, local leaders, institutions and cultivators. The second part familiarizes them with package practices. This means learning how to carry out the recommended practices and explain them to farmers. The third part shows extension workers how to apply these practices in farmers' fields. This heavy emphasis on in-service training is a distinctive feature of the programme. Training has to be given year after year to improve knowledge and skills and to accommodate adjustments in package practices and frequent staff changes. Refresher training also is given to most field-staff workers every year.

There are several methods of gauging IADP progress, although none of them are entirely satisfactory. As time goes on yield figures will tell their own story. Figures for foodgrains are incomplete because detailed data is not readily available for all foodgrain crops. Short-run yields vary widely with the vagaries of the weather. For example, in one district, the rainfall of one year was half the average and another year it was twice the average. Widespread drought in 1965-66 cut yields considerably in many districts.

The number of farm plans drawn up is one index of cultivator's acceptance of the programme. In 1961, there were 55,000 farm plans. By 1966 the number had increased to over a million. A block analysis of the first seven districts showed the average number of participating farmers was 590 in the first year of the programme. By the fifth year it was up to 4,580.

The best performance has been in supplying fertilizers,

although there have been shortages in some areas, chiefly in phosphate. The amount of nitrogen fertilizer used by 1965 ranged from 200 to 600 per cent above the amount used in 1961 in the various package districts. The percentage increase in phosphatic fertilizer was even greater.

An analysis of fertilizers used *per block* in the first seven districts showed that farmers were using ammonium sulphate and superphosphate fertilizers at the rate of 1,280 tons in the programme's fourth year. The seven states in which these districts were located had a statewide block average (minus the IADP districts) of 540 tons. The All-India block average (minus IADP districts) was 520 tons.

IV. LESSONS LEARNED

Results to-date indicate that IADP has succeeded in its main objectives. It has not worked perfectly, but it has shown over a million cultivators new ways of producing more food. Progress is encouraging enough to warrant an expanded programme although experience has highlighted certain problems which demand attention. The most pressing of these problems are beyond the control of individual cultivators. They are national or regional problems which involve such essential services as supplies and credit. Teaching new improved methods of producing food to cultivators and persuading them to use these methods is much easier than organising, say, a timely, continuous supply of fertilizers. It is relatively easy to explain how credit can be used for growing more food. It is much more difficult to evolve a smoothly working credit system which provides cultivators with the right amounts of credit at the right times.

Other large problems require a sustained, national effort to meet them.

For example, one is the need to research new high-yielding crop varieties which will stand up under heavy fertilization. Such varieties are now being developed. The new short-strawed Mexican wheats with their Indian adaptations are producing

double the customary yields. New paddy varieties such as Taichung Native 1, and IR-8 and others hold out similar possibilities. Research stations must continue to meet this need for better varieties.

Another problem is that of maintaining supplies of genetically pure and viable seeds. In some parts of the country this requires special drying and storage facilities. Many small seed farms have sprung up and a new programme is underway to concentrate seed-production on relatively small farms around a seed-processing plant. Two such seed-processing facilities are going up in Thanjavur and West Godavari districts to demonstrate and test this method for handling the seed supply.

The original IADP programme called for price incentives to motivate and encourage farmers. A feasible price incentive policy has now been adopted. It must be administered with enough skill to encourage farmers and still be fair to consumers.

Another problem is better marketing and processing of farm products. A special study of rice mills showed that seven to eight per cent more edible rice can be obtained from raw paddy with modern milling methods. Seven modern rice mills have been established to demonstrate these possibilities. These plants became operative in 1966 and 1967.

Progress in developing new tools for such operations as ploughing, seeding, and plant protection has created a growing, new, nationwide problem. At first the task was to design and test tools or to import models which could be adapted to Indian conditions. Now the problem is to manufacture this equipment on a mass scale to meet the growing demand. The seed-cum-fertilizer drill is a good example. It is especially effective for planting wheat and other small grains. Another is a badly-needed, portable power-sprayer which is in very great demand. Indian manufacturing firms can meet these demands if they have the necessary raw materials and foreign exchange, and if they provide maintenance service.

Supplying farm credit at the right time and then making sure that loans are repaid has proved to be one of the most difficult, and as yet unsolved problems in the programme.

Usually cooperatives are the official source of credit for farmers. The main difficulty has been that most of the cooperatives are far too small. Procedures are often cumbersome. The margins for handling supplies have been fixed at levels that do not induce improved supply service. Finally, collection procedures have been uncertain and overdue amounts have risen, even in the most productive districts.

These are some of the major, substantive problems IADP has encountered. There has been some progress. During the Fourth Plan the Ford Foundation will concentrate its aid to IADP on five districts to seek solutions to these problems.

Improved administrative methods can help solve many of the remaining problems. These are not new problems but they are persistent. The main administrative problems are recruiting and maintaining stable staffs, devising chains-of-command, delegating authority and coordinating the various phases of the programme. Delays in recruiting and posting staff members and frequent transfers result in inefficient use of manpower.

The programme has been continuously evaluated by the Expert Committee on Assessment and Evaluation in the Ministry of Food and Agriculture. The Committee's "Report on the Intensive Agricultural District Programme 1961-63" put this staffing problem in these words:

"After the receipt of the approval of the Government of India to the appointment of additional staff in various categories at different levels, it took the State Governments considerable time to issue detailed sanctions after consulting their Finance Departments. Procedural delays stood in the way of prompt clearance of sanctions. Even after the issue of sanctions, delays occurred in recruitment and appointment of staff. While the bulk of the staff sanctioned at district level was placed in position during 1960-61, this was not the case with staff sanctioned at block level. Even till the end of 1961-62, the full complement of the block level staff such as AEOs and VLWs was not in position in almost all the districts."

The problem also found in staffing other phases of the programme. For example, the Evaluation report said "In the

case of supporting activities like the establishment of implements, workshop, soil testing laboratory, information unit and quality seed programme, the position was still less satisfactory. Here again, recruitment and postings were held up for a long time, with the result that these basic activities, which are intended to strengthen and support the implementation of the Package Programme, could not make satisfactory progress during the years 1960-61 and 1961-62. It was only in 1962-63 that steps were taken by the State Governments to appoint the technical staff approved for these activities. It would, thus, be seen that the programme started with certain handicaps and deficiencies, which, though overcome to large extent, continued to inhibit progress even till the end of 1962-63."

After the initial recruiting of personnel was finally completed, another problem arose which the original plan for IADP had sought to avoid. Personnel were transferred before maximum use could be made of their training and capabilities. Even key people had to leave their jobs before they had been there long enough to really understand the programme and their relation to farmers, resources, institutions and government units under their jurisdiction. A survey in mid-1965 revealed that the average tenure of a district collector in India was 18 months. The district collector is a key man in managing development programmes. In one IADP district there were five collectors in less than five years. In a study made early in 1965 of the tenure of key personnel in 12 IADP districts it was found that in no district had the same collector remained in position from the start of the programme (which was four-and-a-half years from the starting date of the earliest district to the date of the survey). Six districts had two different collectors and the other six had three or four. This was after the states had agreed to keep key personnel in place for the duration of the programme.

The record for the District Project Officers was better. Six of the 12 districts had the same Project Officer from the start. The other six had two or three different ones.

In regard to district agricultural specialists, it was found

that most (approximately three-fourths) of the districts had kept the same individuals in position. But because of recruiting delays the positions were filled only about three-fourths of the time. A notable exception was the position of district plant protection specialist which was filled 96 per cent of the time and in seven of the 12 districts by the same individual. A little over one-half of the DOs, AEOs and CEOs and 41 per cent of the VLWs had less than two years' service in their current positions. It requires one to two years for even the most capable officials to learn enough about the people, their institutions and resources to be able to make any significant contribution to their improvement.

IADP experience with the types of problems outlined has stimulated thinking on possible solutions or, at least, ways of lessening the handicaps of present procedures.

On delays in staffing, it has been suggested that key positions could be filled on a temporary basis by qualified people and that subsequently they could be installed on a permanent basis.

On the matter of promotion transfers, lip-service is given to the concept of keeping people in place, but in practice these promotion transfers continue. One recommendation is to promote a person in place and allow him to remain in his line of work in the same district. It is said that this would increase expenses because promotions would take place within the district and other district jobs open outside the district would have to be filled by more promotions. If this proves true it should be considered part of the increased investment needed to speed progress in agriculture. Even if it costs more, efficient administration requires that indiscriminate and often arbitrary transfers should be reduced to a minimum.

A proposal which offers some hope of relief is that when a transfer is unavoidable, a successor should be posted and *should be in place* at least two months before the incumbent leaves the post. This would go a long way towards overcoming the hiatus which occurs when an essential officer is transferred and his post remains vacant for weeks and months, while important work is neglected.

As to operations, administrative control of budget, staff and programme should be delegated to the district. Agricultural development is essentially a *local* operation at the farm and village level.

Regarding chains-of-command, there has been a growing demand from the districts that the District Project Officer should have direct authority over the block staffs, that is, over BDOs and VLWs. In practice, if there are sufficiently good personal relationships, the programme can move forward, but this bogs the question. For an effective programme the Project Officer must have effective authority over those working on the programme. Frequently, Project Officers have found that VLWs, for example, are ordered to work on non-agricultural projects at a time when agricultural needs are greatest.

A somewhat similar problem arises with regard to collectors. IADP looked to the collector to coordinate the programme in each IADP district. For the most part this worked well. When collectors are interested in agricultural development and when they can remain in place long enough to thoroughly understand the programme, they can be very effective. Lacking this, necessary authority with the Project Officer is desirable.

This question of chain-of-command received attention at the Central Conference of Key Personnel of Intensive Agricultural Programme at New Delhi in December 1965. One of the working group reports on Administrative and Organisational Matters included the following statement under the heading of "Line of Control".

"It was felt that unless the Agricultural Department exercises effective control over the VLWs and the BDOs, it would not be possible to use them for agricultural production to the extent desired. The Working Group on Inter-Departmental and Institutional Coordination of Agricultural Production had gone into this question and recommended that the Agricultural Extension Officers should initiate the character roll of VLWs and the DAOs should initiate the character roll of BDOs. It was agreed that this recommendation should be implemented wherever it had not been done.

"It was pointed out that in some of the districts like Aligarh the Project Officer exercised control over the district level officers of all departments concerned with agricultural production like the District Animal Husbandry Officer, Soil Conservation Officer, Assistant Registrar of Cooperative Societies, etc. Such an arrangement has contributed greatly to effective coordination and proper supervision. It was recommended that in all Intensive Agricultural Districts the Project Officer should control the concerned technical officers and be given the authority to write their character rolls".

No state as yet puts the district fully in charge of its annual budget. The result, is a continual series of time-consuming efforts and minor frustrations trying to use a budget which already has been sanctioned.

A third difficulty has been insufficient delegation of powers to the project officers. Even though there was some delegation of authority at the beginning of the programme to expedite the programme, as the programme progressed and became more complex, these powers were inadequate.

The feeling is that more powers should be delegated to District Collectors and Project Officers to : (1) buy current supplies and keep an adequate inventory ; (2) create flexibility in operations; (3) keep the staff sufficiently mobile to make field work effective, and (4) manage such units as seed farms, implements, workshops, soil-testing laboratories, and district information offices.

Coordination committees have worked satisfactorily when they meet regularly, but some committees meet very infrequently. Another difficulty with coordination committees, especially in the states, is that even after decisions are made, actions must be approved by administrative and finance departments even though these departments are represented on the coordinating committee.

There are numerous other difficulties concerned with transport, incentives, and so on but the ones mentioned above are some which have persistently handicapped the programme and which must somehow be solved.

Along with promotion in place, some other suggestions for staff improvement are greater incentives, not necessarily in terms of money, but in recognition, advanced training, better housing and similar encouragement.

On chain-of-command, the suggestion has been made that the Agricultural Department should be responsible. The decision taken some time ago in Madhya Pradesh to eliminate the post of Block Development Officer and place the agricultural staff under the Agricultural Department is a significant experiment along these lines.

A start towards a more rational delegation of powers is incorporated in a recommendation made at the recent IADP conference in New Delhi to the effect the Centre should work out a model of administrative and financial powers to be delegated to the Project Officers and that this model should be circulated for state governments to adopt.

On coordination, the principal recommendation is that meetings of coordination committees should be held at least once every three months and that steps should be taken to carry out decisions promptly.

V. THE FUTURE

Can the Package Programme be extended successfully to other parts of the country?

One answer to this question is the government's decision to extend the package *concept* to more than 100 of India's 325 districts, even before the programme had completed its initial five-year period. Much of India's hopes for substantially increasing food production rest on this new Intensive Agricultural Areas Programme. IAA will use essentially the same IADP methods although it will be less intensive.

A second answer is that the programme to increase the acreages of high yielding varieties is being carried on chiefly in the IADP and IAA districts and that the package concept is recommended for these varieties. Administratively, it would appear that if the desired principles of centralizing responsibility in an IADP

Project Officer, and establishing an effective district organization can be made effective, the IAA programme can succeed. There will be need for large numbers of people possessing actual or potential administrative skill to extend the intensive programme concept to the large number of districts which have been earmarked for the IAA programme. And many of the problems which arose in IADP must be solved if IAA is to produce effective results during the Fourth Plan.

Some New Proposals for Administration

Since the seminar was held in March 1966 two proposals related to administration of the intensive agricultural programmes have been put forward and have had an interested response.

The Ford Foundation made an in-depth study of district agricultural administration in Ludhiana district in the Punjab. From this study a plan for reorganising district administration for intensive agricultural programmes was prepared and was submitted to the states for consideration. It has been adopted in large part in Madhya Pradesh and is under consideration elsewhere.

The proposal would:

- (a) clarify administrative lines for all staff assigned to the agricultural development effort.
- (b) Make administrative and technical levels coincide.
- (c) Place agricultural staff clearly in the same administrative and career lines.
- (d) Permit staff organisation which will make programme-operations most effective at the cultivators' level.
- (e) Permit flexibility in operation required to move the programme ahead.

The district reorganisation study was made because of the firm conviction, based on IADP experience, that a streamlining of the organisation and operation of the district staff is imperative for continued agricultural progress.

A second proposal which has attracted lively attention is

the proposal for establishing development corporations in IADP districts. These corporations would be public sector enterprises, but would have a high degree of autonomy and would be empowered to lend funds, to engage in agricultural custom operations, to encourage custom work, minor irrigation work, etc. A principal gain from the development corporation concept is that it could move much more expeditiously than normal bureaucratic channels to get action going on needed development programmes. The development corporation idea was being actively considered in several states in the first half of 1967.

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